

UMCES Reaffirmation of Accreditation 2021



Acronyms

AAAC	Academic Affairs Advisory Council
AAUW	American Association of University Women
AC	Administrative Council
AL	Appalachian Laboratory
BOR	Board of Regents
BOV	Board of Visitors
CBL	Chesapeake Biological Laboratory
COI	Conflict of Interest
COMAR	Code of Maryland Regulations
CLO	Course Learning Outcomes
CUSF	USM Council of University System Faculty
CUSP	Council of University System Presidents
CUSS	USM Council of University System Staff
DEIC	Diversity, Equity, and Inclusion Collaborative
DEIJ	Diversity, Equity, Inclusion, and Justice
EC	Executive Council
FS	Faculty Senate
FSU	Frostburg State University
GA	Graduate Assistant
GEC	Graduate Education Committee
GFC	UMCES Graduate Faculty Council
GRAs	Graduate Research Assistants
GPILS	Graduate Program in Life Sciences
GSC	UMCES Graduate Student Council
HBCU	Historically Black College or University
HPL	Horn Point Laboratory
HR	Human Resources
IA	Institutional Assessment
IAN	Integration and Application Network
IMET	Institute of Marine and Environmental Technology
ISG	Issue Study Group
IVN	USM Interactive Video Network
LMRCSC	Living Marine Resources Cooperative Science Center
LOA	Learning Outcomes Assessment
MCEA	Maryland Classified Employees Association
MDSG	Maryland Sea Grant
MEES	Marine-Estuarine-Environmental Sciences Graduate Program
MHEC	Maryland Higher Education Commission
MSCHE	Middle States Commission on Higher Education
NSF	National Science Foundation
NOAA	National Oceanic and Atmospheric Administration
OTD	Office of Technology Development

ORAA	Office of Research Administration and Advancement
PCC	Programs, Curricula, and Courses (Committee)
PLO	Program Learning Outcome
PD	Professional development
REEF	Ratcliffe Environment Entrepreneurs Fellowship
REU	Research Experiences for Undergraduates
SC	Staff Council
SESYNC	Socio Environmental Synthesis Center
STEM	Science, Technology, Engineering, and Mathematics
SWMS	Society for Women in Marine Science
TLTC	Teaching and Learning Transformation Center
UMB	University of Maryland Baltimore
UMBC	University of Maryland, Baltimore County
UMCES	University of Maryland Center for Environmental Science
UMD or UMCP	University of Maryland, College Park
UMES	University of Maryland Eastern Shore
UMGC	University of Maryland Global Campus
USM	University System of Maryland
VPA	Vice President for Administration
VPE	Vice President for Education
VPSI	Vice President for Strategic Initiatives
WG	Working Group

UMCES

Globally eminent and locally relevant, the University of Maryland Center for Environmental Science is the University System of Maryland’s premier environmental research institution.



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Executive summary

The University of Maryland Center for Environmental Science (UMCES) is a research, education, and service institution of the University System of Maryland (USM) and a world leader in the science of coastal environments and their watersheds. UMCES operates under a legislative mandate to “conduct a comprehensive program to develop and apply a predictive ecology for Maryland to the improvement and preservation of the physical environment, through a program of research, public service, and education.” UMCES faculty advance knowledge through scientific discovery, integration, application, and teaching, resulting in a comprehensive understanding of our environment and natural resources and helping to guide the state and world toward a more sustainable future. UMCES is proud of its long history of graduate education in the environmental sciences, with hundreds of successful M.S. and Ph.D. students trained over more than 40 years.

UMCES is the smallest independent university of the 12 USM institutions, with 74 graduate faculty, 94 graduate students, and approximately 450 total employees. It is also the most geographically dispersed campus, with six sites distributed across Maryland from the Appalachian Mountains in the west to the Delmarva Peninsula to the east. The geographic dispersion of UMCES sites gives it a presence throughout Maryland and facilitates research on a wide range of environmental topics, but it also presents logistical challenges. The average driving distance between UMCES sites is 104 miles, the average driving time is 1.5 hours, and public transportation options are limited. For this reason, UMCES was one of the original pioneers of interactive video communication and teaching in the USM 30 years ago. UMCES’s long experience with synchronous online instruction made for a relatively seamless transition to fully online teaching during the COVID-19 pandemic.

UMCES has been involved in higher education for more than 90 years, since shortly after the founding of its first unit, the Chesapeake Biological Laboratory (CBL), in 1925. These early efforts were focused entirely on residential summer programs aimed at undergraduate students who took courses taught by resident and visiting faculty at CBL. UMCES became formally involved in graduate education with the establishment of the USM-wide graduate Marine, Estuarine, and Environmental Science (MEES) Program in October 1978. MEES is an inter-institutional graduate program of the USM whose mission is to educate students to become scientific leaders and problem-solvers for the environmental issues of the future. UMCES plays a leading role in MEES, with a plurality of the MEES student body and majority faculty representation on MEES governing committees. The UMCES faculty teaches approximately 95% of MEES graduate courses. UMCES faculty also advise a small number of students in other inter-institutional graduate programs, the Graduate Program in Life Sciences (GPILS)

at University of Maryland Baltimore (UMB) and two Masters programs in Biology at Frostburg State University (FSU).

From 1978 through 2013, graduate students advised by UMCES faculty members received M.S. and Ph.D. degrees from other degree-granting institutions of the USM, primarily the University of Maryland at College Park (UMCP). Although the diplomas of these earlier graduates do not formally carry the UMCES institutional seal, the students carry the influence of the UMCES faculty in their training, their research activities, and ultimately in their professional careers.

However, UMCES leadership and faculty desired more control over their students’ educations, more credit for the effort UMCES invested in education, and access to funding sources only available to accredited institutions. In 2012, led by former UMCES President Dr. Donald Boesch, UMCES began the process of seeking its own graduate degree-granting authority and accreditation. UMCES was granted authority by the Maryland General Assembly to “award graduate degrees in marine and environmental sciences jointly with another public sector higher education institution and award post-baccalaureate certificates.” Subsequently, the USM Board of Regents (BOR) authorized UMCES to seek accreditation through the Middle States Commission on Higher Education (MSCHE). UMCES began the accreditation process immediately following the BOR’s decision, led by then Vice President for Education (VPE) Professor Edward Houde. After a long, multi-step process, culminating in a successful Accreditation Evaluation Team visit in November 2015, UMCES received accreditation from MSCHE in March 2016. In its Accreditation Letter, MSCHE requested that UMCES follow up with a Progress Report in April 2018. The Progress Report was submitted under the direction of current VPE Professor Lawrence Sanford and was approved in June 2018.

The present UMCES Self-Study for Reaffirmation of Accreditation was launched in January 2019 to synthesize information generated since 2015 and build on the foundation developed in the 2018 Progress Report. Most of 2019 was organizational with the appointment of a Steering Committee and Working Groups (WGs), followed by drafting and approval of a Self-Study Design. The Design established seven WGs, each tasked with addressing one MSCHE Standard of Accreditation. The WGs were chaired by a senior administrator and/or a full professor, but included faculty, staff, and student members totaling almost 20% of UMCES employees. WGs met periodically throughout 2020 and into early 2021 and consulted hundreds of pieces of evidence in preparing their reports. Regular meetings of the WG Chairs were held to coordinate among themselves and discuss overall progress. Drafts of the seven primary chapters were completed in early 2021 and underwent

through internal review and revision. An introduction and conclusions chapter were crafted and a full first draft was distributed for review by the UMCES community and the Steering Committee at the end of Q2 of 2021. MSCHE Evaluation Team Chair Dr. Margaret Tivey reviewed the final version of the first draft and discussed her findings and recommendations with the UMCES Accreditation leadership team during a virtual visit in July 2021. This, the final UMCES Self-Study for Reaffirmation of Accreditation, was prepared after careful revisions and selected additions based on her review.

The Self-Study is presented in nine chapters, with introductory and concluding chapters bookending the seven primary chapters, each of which addresses one of the MSCHE Standards of Accreditation. The introduction provides context and background for the remainder of the Self-Study. All the primary chapters follow a common order, beginning with a statement of purpose quoting that chapter's Standard and listing 5-9 questions designed to elicit an evidence-supported assessment of how well UMCES meets the Standard. Brief sections on scope and methods are followed by a results section that addresses each question in order, citing detailed evidence to support the analysis, and listing recommendations for improvement. A discussion of the impacts of the COVID-19 pandemic with respect to that chapter is followed by a description of connections between that chapter and the others. A summary of the most important conclusions and recommendations ends each chapter. All cited evidence is presented in *blue italic font* and may be found in the Evidence Library as an Adobe Acrobat file under the same name. Evidence derived from the UMCES Graduate Student Handbook and the UMCES Policies and Procedures Manual are located under the Evidence Inventory URLs tab. The concluding chapter is presented as a convenience for the reader. It is a compilation of the purpose, primary conclusions, and primary recommendations of each of the primary Standards-based chapters. This compilation was used as the basis for the more integrative discussion below.

The overarching conclusion of this Self-Study is that UMCES meets all seven MSCHE Standards of Accreditation, satisfies all Requirements of Affiliation and can verify full compliance with federal regulations. Building on the strong foundations of the 2015 Self-Study and the 2018 Progress Report, and summarizing the highlights of many more detailed conclusions in the chapters, UMCES has made major strides toward:

1. Implementation of regular, innovative Institutional Assessment (IA), and its use to guide future directions;
2. Formulation of rigorous graduate learning outcomes assessments and plans for their use in programmatic evaluation and educational improvement;

3. Implementation of a new, innovative MEES curriculum that increases interdisciplinarity while maintaining disciplinary rigor and providing professional development instruction;
4. Establishment of educational governance committees to ensure curricular quality and organization, and to continue guiding and expanding learning outcomes assessment;
5. Improved support of the student experience, and increased opportunities for student participation in shared governance; and
6. Renewed, institutionally supported efforts to increase diversity, equity, and inclusion in the UMCES community.

While these conclusions demonstrate the strength of UMCES current position, the WGs also recognized that UMCES has not yet realized its full potential and recommended a variety of actions toward further institutional improvement. These recommendations fall under seven broad themes. Discussed in more detail below, the themes include **communication, assessment, education, support, diversity, data, and finances**.

UMCES is a complex institution, with six sites widely distributed across Maryland and three graduate education programs, the largest of which is in cooperation with four other USM institutions. This complexity has long posed problems for **communication**, both internally and externally. Five of the seven WGs had specific suggestions for improving communication. WG1 recommended development of a single, very concise mission statement, easy to remember and used for all external communications. WG3 recommended combining UMCES two current education webpages into one, with information visible both externally and internally except as necessary to ensure confidentiality and privacy. WG4 similarly recommended easier access to information about student support. WG5 recommended increasing the visibility of UMCES educational goals. WG7 recommended more frequent interaction between all the shared governance bodies and increased opportunities for informal gatherings across the institution, both virtual and in person. UMCES recognizes the importance of communication and is already acting on these recommendations.

UMCES has a long history of **assessment**, both in response to state mandates and for internal self-examination, ranging from assessment of individual performance to assessment of institutional function. Except for state and federally mandated yearly audits and employee performance reviews, however, assessments have tended to be ad hoc for specific purposes. Six of the seven WGs recommended increased assessment regularity and increased use of assessment results. Recommendations included regular 5-year review of policies and procedures; continued regular use and improvement of the Institutional Assessment (IA) report card; regular assessment of work climate and employee

(especially student) needs; continued development, implementation, and use of learning outcomes assessments; standardization of faculty performance evaluations; and periodic assessment of the assessment procedures themselves. UMCES recognizes the value of regular assessment and its use for planning and improvement, and is committed to following through on these recommendations.

UMCES is proud of its offerings in graduate **education** and was at the forefront of using synchronous online education methods to deliver instruction starting more than 25 years ago. However, few UMCES instructors have kept up with recent advances in pedagogy or asynchronous online instruction. WG3 recommended that UMCES work to incentivize its faculty to pursue innovative teaching methods, both for improved learning and to allow further development of extended education offerings. Plans for offering extended education and collaborative program development with other campuses were not discussed in this Self-Study because they are preliminary, but UMCES sees these programs as critical to increase its educational reach. WG3 also recommended that UMCES should continue to lead its signature graduate education vehicle, the MEES program, towards improvement through rigor and innovation, with national leadership of interdisciplinary training in the environmental sciences as its ultimate goal.

All UMCES students are enrolled through partner institutions, primarily UMCP, such that UMCES has neither registrar nor student affairs offices. This creates a conundrum for student **support**, since most UMCES students live and work at UMCES laboratories far from their campus of enrollment. However, almost all UMCES students are UMCES employees, so are eligible for employee benefits. Partly because of the separation between workplace and regular student services, and partly because of limitations in the initial IA design, student services received one of the lower grades in UMCES 2018 IA. The UMCES VPE Office has made great efforts to improve student services, but WG4 identified several recommendations for further improvement. These include improved access to information through website revisions, continued regular assessment of student support, better training and regular discussion about student-mentor relationships, implementation of an UMCES ombuds program, more opportunities for UMCES-wide student meetings, and continued work to improve alumni engagement. Improved student support was also recognized as an important goal by several other WGs.

The geophysical and environmental sciences have made little progress toward increasing **diversity** in their ranks during the past four decades. UMCES, along with many of its peer institutions, has committed to addressing this problem holistically and soon. The UMCES Diversity, Equity, and Inclusion Collaborative (DEIC) was established in June 2020 to organize and promote related efforts. It recognized immediately that increasing inclusivity for all within the UMCES community is a

prerequisite for attracting and retaining employees from more diverse backgrounds, as well as improving the work environment for current employees. WG2 recommended implementing an UMCES ombuds program for all UMCES employees, not just students. One DEIC recommendation currently being enacted is that UMCES will be partnering with external organizations to conduct cultural climate surveys in 2021. Simultaneously, UMCES units are increasing efforts to attract and entrain under-represented minorities beginning with K-12 students and including undergraduate interns, graduate students, post-docs, faculty, and staff. UMCES should continue to support DEI efforts of all kinds.

UMCES has no dedicated IA office, and as a result **data** about the institution is collected, managed, and archived in several different offices. This can make it difficult to assemble and compare consistent data of different types, such as employment, enrollment, outreach, financial, facilities, and research productivity information, especially when faced with short deadlines for reporting. WG7 recommended that the various UMCES offices meet regularly to coordinate institutional data management and possibly implement a centralized data repository.

Finally, while UMCES has weathered the COVID-19 pandemic without overly dire consequences, the associated loss of 9.5% of state appropriation revenues has strained institutional **finances**. WG6 recommended consideration and implementation of a revised financial model to help grow the institution in line with its Strategic Initiatives plan. Further, there are new potential revenue opportunities that are not currently being pursued. The USM understands the unique financial constraints that the state budget cut imposes on UMCES and is working to ensure UMCES long-term financial viability.

The COVID-19 Pandemic disrupted the UMCES Self-Study process, and indeed most of life-as-normal at UMCES. While there were many aspects of this disruption, the largest by far were the amounts of time and effort required to meet the immediate challenges of the pandemic. Our primary objective was to ensure the safety of UMCES personnel and the communities in which we are located. Immediate challenges included safe continuation of the research programs that support our students and researchers, continuation of quality course delivery, support of students and other personnel through sudden changes in personal or family conditions, adjustments in work protocols to maintain both functionality and safety, maintenance of animal care under our IACUC assurance with the US Public Health Service, communication with the USM, and attention to fiscal disruptions in research grants or state appropriations associated with the pandemic-induced recession. Many of these needs are still ongoing and are likely to persist well past the “end” of the pandemic, due to disruptions in research programs, student timelines, and budgets. UMCES appreciated the offer by MSCHE to delay its Self-Study submission to summer 2021 and its Evaluation Team visit to fall 2021. Each chapter in the Self-Study includes a chapter-specific

section on the challenges of the pandemic and how they were and are being met.

Despite all the disruptions, the COVID-19 pandemic has highlighted that UMCES has the administrative and governance structures in place to successfully respond to emergencies and campus-wide challenges. UMCES extramural sponsored awards and proposals remained steady throughout the pandemic. Our faculty found innovative ways to continue their work even when we were ordered to severely limit access to our state facilities to essential personnel only. Faculty who were approaching tenure and promotion were given the option to request a one-year extension. The transition to fully online synchronous instruction was fast and nearly seamless, due to UMCES' long tradition of classroom-based interactive video network instruction. The only change was moving from connected classrooms to connected individuals. International students who could not travel to UMCES were offered a fellowship by the UMCP graduate school that covered their tuition, thus ensuring they did not fall behind in their studies. Graduate research stipends and teaching assistantships for UMCES students were maintained during all phases of the pandemic, and UMCES is working hard to identify both internal and external sources of funding to support students who have had to extend their tenure at UMCES due to research interruptions. UMCES held two very successful virtual Commencement ceremonies in May 2021 and 2022, that were attended in large numbers by family, friends, other students, and alumni that might not have been able to participate otherwise. The pandemic has been a challenging experience for everyone, but it has in many ways highlighted the UMCES collegial environment and brought the UMCES community closer.



Created in 2014, the UMCES seal is based on a bas relief stone sculpture that is over the doorway of Beaven Hall on UMCES's founding laboratory, the Chesapeake Biological Laboratory. It has the elements of water, seagrasses, crabs, oysters, fish, and oak leaf, representing all of the UMCES laboratories and their areas of study.

Introduction

The University of Maryland Center for Environmental Science (UMCES) is a research, education, and service institution of the University System of Maryland (USM) and a world leader in the science of coastal environments and their watersheds. UMCES faculty advance knowledge through scientific discovery, integration, application, and teaching, resulting in a comprehensive understanding of our environment and natural resources and helping to guide the state and world toward a more sustainable future. Through its role administering the Maryland Sea Grant College and participation in numerous collaborative programs with other institutions, UMCES leads, coordinates, and catalyzes environmental research and education within the USM.

UMCES's rich tradition of conducting excellent research, education, and public outreach related to natural resources and the environment fulfills expectations expressed in its enabling legislation. UMCES operates under the laws of Maryland as codified in both the Natural Resources Article and the Education Article to "conduct a comprehensive program to

develop and apply predictive ecology for Maryland to the improvement and preservation of the physical environment, through a program of research, public service, and education." UMCES Mission and Goals are addressed in detail in Chapter 1.

History and Overview

UMCES traces its origin to the founding of the Chesapeake Biological Laboratory (CBL) in Solomons, MD, in 1925. CBL is the oldest permanent, state-supported marine laboratory on the east coast of the United States. Dr. R. V. Truitt, CBL's first Director, committed CBL to a pathway that recognized that to understand environmental challenges it was necessary to adopt a truly interdisciplinary approach that combined physical, chemical, and life sciences with social sciences. While there have been several administrative reorganizations in the almost 100 years since UMCES's founding in 1925, our current program of research, teaching, and service is clearly faithful to that founding vision. The evolution of UMCES as

A brief synopsis of the evolution of UMCES

1925	Chesapeake Biological Laboratory (CBL) established (Solomons, MD)
1941	Dept. of Research and Education created as an independent state agency by legislation, including CBL
1961	Natural Resources Institute (NRI) created to incorporate the previously independent Dept. of Research Education into the University of Maryland by legislation. Appalachian Laboratory established (Frostburg, MD)
1973	Center for Environmental and Estuarine Studies (legislation, 1975), Horn Point Laboratory established (Cambridge, MD) Two NRI laboratories closed
1997	Legislative act renames the Center for Environmental and Estuarine Studies to University of Maryland Center for Environmental Science
2000	Maryland Sea Grant College Program (College Park, MD), a partnership with the National Oceanic and Atmospheric Administration, placed under UMCES administration
2010	Institute of Marine and Environmental Technology reorganized as partnership among UMCES, University of Maryland Baltimore County, and University of Maryland, Baltimore (Baltimore, MD)
2013	UMCES authorized to award joint graduate degrees and post-baccalaureate certificates (legislative act) UMCES initiated actions to gain accreditation through the Middle States Commission on Higher Education (MSCHE) and was granted Candidate status in November 2013
2014	UMCES awarded its first MS and PhD degrees, jointly with the University of Maryland College Park
2015	UMCES celebrates its 90th anniversary
2016	UMCES granted accreditation to award graduate degrees and certificates
2021	UMCES submits its Self-Study for Reaffirmation of Accreditation to MSCHE

an academic institution within the USM is traced in the Evolution of UMCES table above. The recent history of UMCES began in 1973 when the Center for Environmental and Estuarine Studies (CEES) was established, including CBL, the Appalachian Laboratory (AL) and the Horn Point Laboratory (HPL). The UMCES name was adopted by legislation in 1997. The Maryland Sea Grant College (MDSG) has been administered through UMCES since 2000. The Integration and Application Network (IAN) was launched in 2002 to specifically address the integration and application of environmental science. Elements of the Institute of Marine and Environmental Technology (IMET) were assigned to UMCES in 2010. Each addition to UMCES has added diversity and depth. The diversity of disciplines and the presence of Laboratory Units across Maryland (Figure I.1) have allowed UMCES to gain regional recognition while conducting highly successful, globally eminent, interdisciplinary research and education programs in the environmental sciences and remaining responsive to the needs of the citizens of Maryland.

Since 1973, UMCES has operated as an institution within what is now the USM. With 74 graduate faculty members and 94 graduate students, UMCES is the smallest of the 12 USM institutions. UMCES is administered as a single institution of the USM with research laboratories

strategically distributed across the state (Figure I.1). UMCES presently conducts research programs through four laboratories: Appalachian Laboratory in Frostburg; Chesapeake Biological Laboratory in Solomons; Horn Point Laboratory in Cambridge; and the Institute of Marine and Environmental Technology in Baltimore. UMCES also administers the Maryland Sea Grant College, with offices in College Park, MD. UMCES Center Administration is located on the Horn Point campus near Cambridge. The Integration and Application Network is a science synthesis and communication branch of UMCES Center Administration that maintains offices both at Horn Point and in Annapolis.

The geographic dispersion of UMCES sites gives it a presence throughout Maryland and facilitates research on a wide range of environmental topics “from the mountains to the sea and from genes to ecosystems” (*UMCES Annual Report 2018*). However, it also presents logistical challenges because of the physical separation of its locations (Table I.1). Not counting the University of Maryland at College Park (UMCP, a separate campus of the USM), the average driving distance between UMCES sites is 104 miles, the average driving time is 1.5 hours, and public transportation options are limited. For this reason, UMCES was one of the original pioneers of the

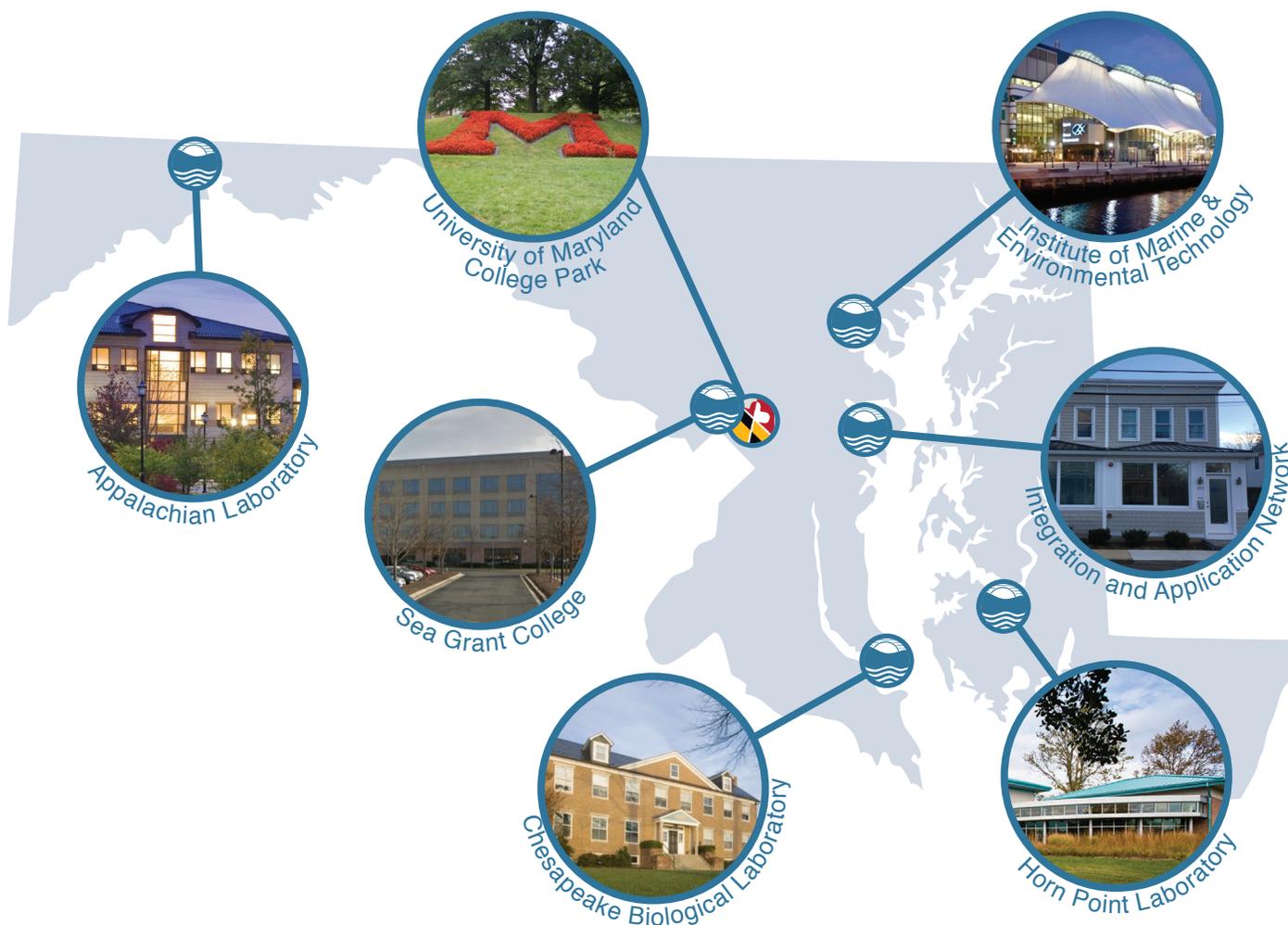


Figure I.1 – Locations of UMCES administrative units and main University of Maryland Campus in Maryland.

CA	HPL	CBL	IMET	AL	IAN	MDSG	UMCP
	<i>Travel times</i>	2:33	1:55	3:44	1:28	1:48	1:49
	<i>Travel distances</i>		1:47	3:45	1:23	1:23	1:26
HPL	115 mi						
CBL	89 mi	81.1 mi		2:24	0:46	0:45	0:41
IMET	227 mi	208 mi	150 mi		2:43	2:28	2:24
AL	61.7 mi	57.3 mi	31.8 mi	172 mi		0:38	0:39
IAN	86.5 mi	66.8 mi	35.1 mi	148 mi	27.2 mi		0:05
MDSG	87.5 mi	67.8 mi	32 mi	143 mi	30.4 mi	1.5 mi	
UMCP							

Table I.1 – Driving distances (below diagonal) and times (above diagonal) between UMCES units and UMCP.

USM Interactive Video Network (IVN) 30 years ago. The IVN system allowed synchronous teaching and meetings between individual UMCES laboratories, with other campuses throughout the USM, and with other institutions around the world. As a result, adapting to COVID-19 pandemic restrictions was relatively straightforward for UMCES; the technology changed to individual Zoom connections, but the practices were largely already in place.

The administrative structure of UMCES and its institutional connection to the USM are illustrated in Figure I.2. Under the leadership and vision of the President, the UMCES executive team, comprised of the Vice Presidents and Unit Directors, is responsible for budgeting, planning, and operation of the laboratories and educational programs, and representation to the USM and the State. UMCES President Goodwin is a member of the Council of University System Presidents, with responsibilities delegated by the Board of Regents (BOR) and Chancellor. President Goodwin also serves as the USM Vice Chancellor for Environmental Sustainability, as did his predecessor since 2008. In recognition of the important role that UMCES plays in the environmental affairs of the state of Maryland, the UMCES President is specifically included as a member of the Governor's Council on the Chesapeake Bay (a subcabinet maintained under the past seven governors, by Executive Order), Coast Smart Council (by statute), and the Maryland Commission on Climate Change (by statute). Vice Presidents and Unit Directors also serve as UMCES representatives on other USM and State councils and

committees. UMCES Leadership, Administration, and Shared Governance are addressed in detail in Chapter 7.

Graduate Education

UMCES has responsibly conducted education for more than 90 years. In the institution's early days, efforts were focused entirely on residential summer programs aimed at undergraduate students who took courses taught by resident and visiting faculty at CBL. A brochure from 1932, only seven years after the institution's founding, lists courses in Invertebrates, Economic Zoology, Protozoology, Embryology, Animal Ecology, Paleontology and Zoological Problems, which were taught by faculty from CBL, UMCP, Goucher College and the Johns Hopkins University. These courses attracted undergraduate and graduate students but did not represent a comprehensive graduate program; credit for the courses was arranged by the participating students and their home institutions. These summer courses continued until the 1970s.

UMCES Graduate Education Programs are described in detail in Chapter 3 but summarized here. UMCES became formally involved in graduate education with the establishment of the USM-wide graduate Marine, Estuarine, and Environmental Science (MEES) Program in October 1978. MEES, which was authorized by the Maryland State Board for Higher Education, is an inter-institutional graduate program of the USM whose mission is to educate students to become scientific leaders

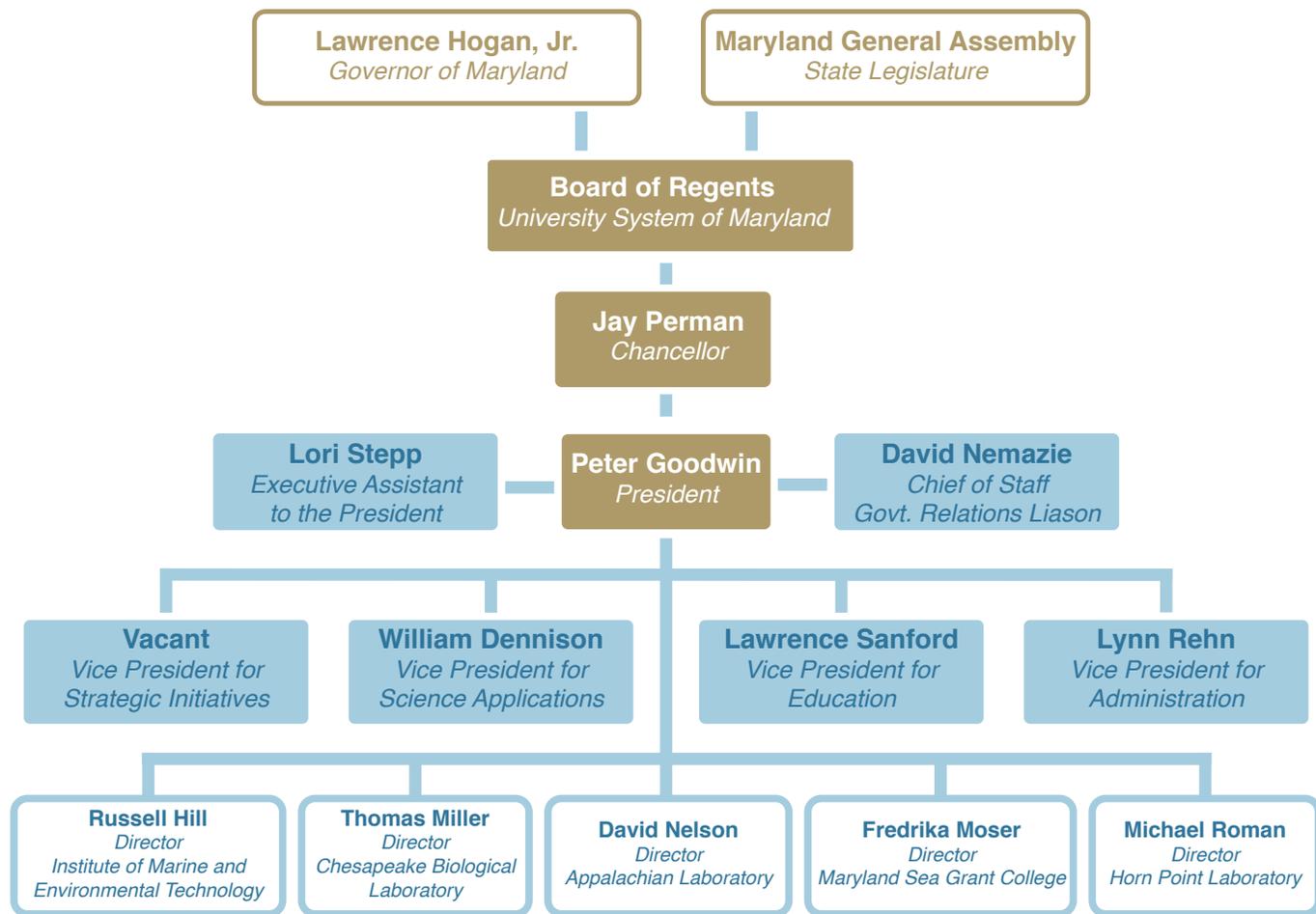


Figure I.2 – Administrative structure of UMCES within the University System of Maryland. The Administration includes four Vice Presidents (Administration, Strategic Initiatives, Education, and Science Application). Four Laboratory Directors and the Director of Maryland Sea Grant College complete the administrative leadership.

and problem-solvers for environmental issues of the future (*MEES Program Overview*). The program includes faculty and students from several USM graduate degree-granting universities and research institutions, including UMCP, UMCES, University of Maryland Baltimore (UMB), University of Maryland Baltimore County (UMBC), and University of Maryland Eastern Shore (UMES). UMCES plays a leading role in MEES, with a plurality of the MEES student body and majority faculty representation on MEES governing committees. The UMCES faculty also teaches approximately 95% of MEES graduate courses. The MEES program is administered by a director and central office located at UMCP. UMCES faculty members advise, teach, and serve as mentors to graduate students primarily enrolled in MEES, although UMCES faculty also advise a few students in two other graduate programs, one at Frostburg State University (FSU) and the other at UMB. Figure I.3 illustrates the multiple close links between UMCES and MEES.

Students enrolled in UMCES graduate programs receive highly personalized academic and research-based educations. Education facts and statistics are updated annually and are published in a *Student Outcomes* document. Some of these facts and statistics are highlighted here to provide an overview of the recent

state of UMCES graduate education. There were 94 graduate students and 74 graduate faculty members in 2020, distributed across the UMCES laboratories in approximate proportion to local faculty size such that the student:faculty ratio ranged from 1:1 to 2:1 with an average of 1.3:1. Almost all UMCES students are supported by research grants or fellowships; UMCES has few teaching assistantships because it offers no undergraduate classes. No UMCES students are admitted without a committed advisor and financial support. The net result is that UMCES graduate students receive personal attention from their advisors and are financially supported through their graduate careers. This level of institutional and faculty commitment translates to a 100% second year retention rate and a 95% graduation rate across UMCES. In 2020, recent time-to-degree averaged 3.2 years for a MS and 6.8 years for a PhD; the latter is slightly higher than in past years. Recent UMCES graduates are dominantly employed in academia and the federal government, with significant fractions also continuing their graduate studies or working in private industry (Figure I.4).

The UMCES student body is both more diverse and more female than either the faculty or UMCES as a whole (Table I.2). The differences are particularly noticeable in

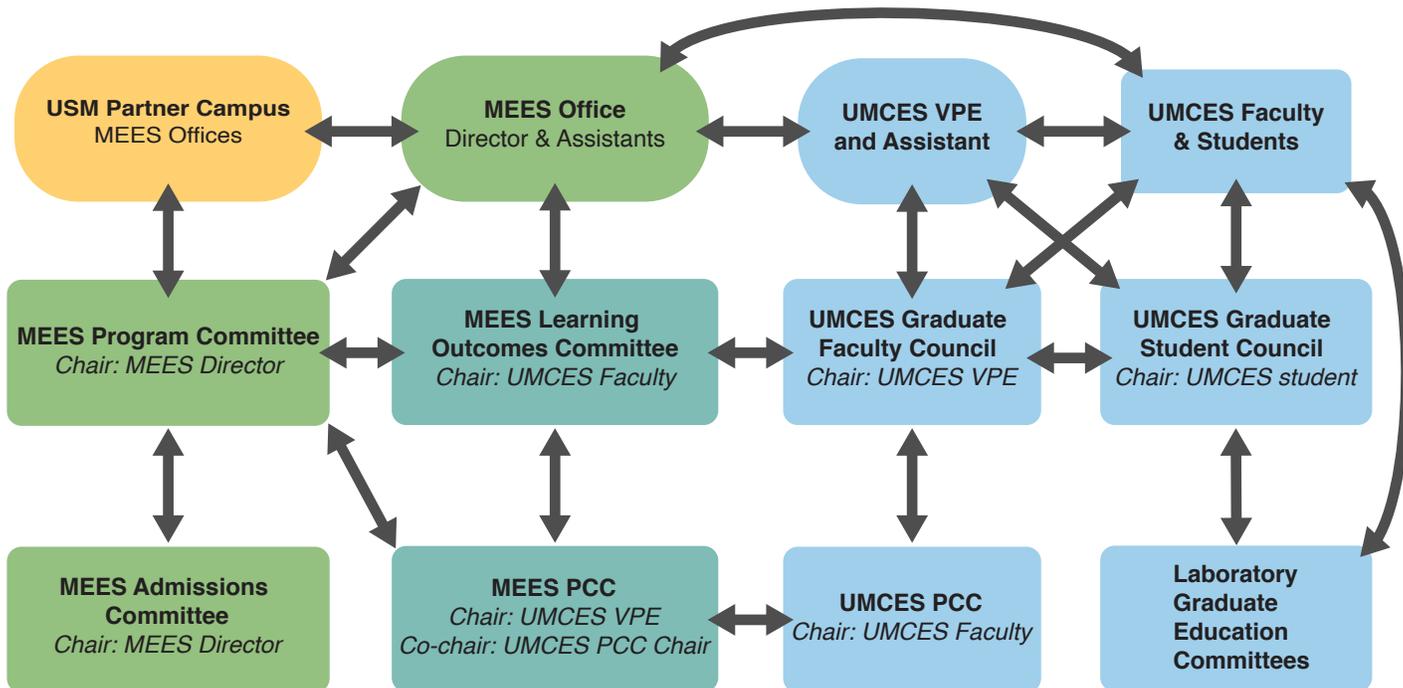


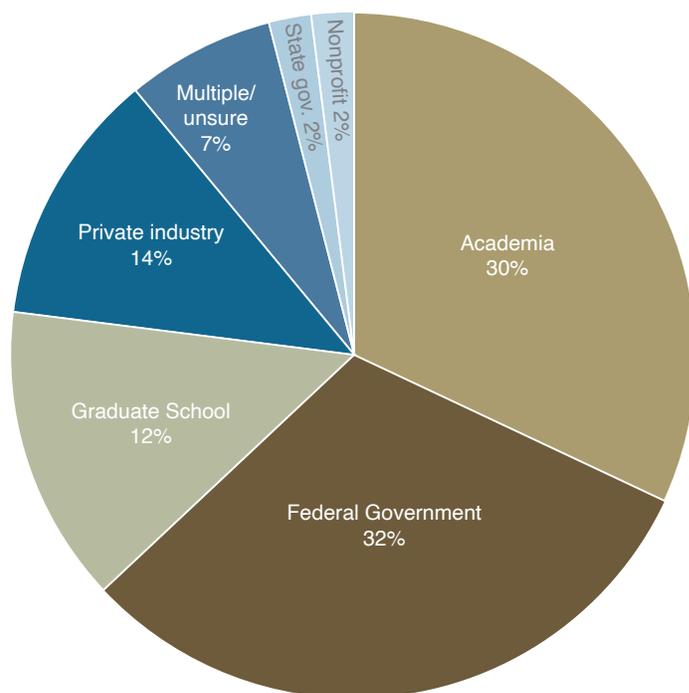
Figure I.3 – Linkages within and between UMCES graduate education and the MEES program.

comparison to the UMCES faculty, which is predominantly white and male. In comparison to State of Maryland demographics, UMCES students are much more Asian, more Caucasian, much less African American, less Hispanic, and more female. The relative lack of UMCES students and faculty of color is not surprising. A landmark publication in 2018 indicated little progress nationwide on increasing racial diversity in 40 years in the earth, atmospheric, and ocean sciences (*Bernard and Cooperdock 2018*). UMCES is not satisfied with this status quo and is actively driving change. For example, in 2020 UMCES established a Diversity, Equity, and Inclusion Collaborative (DEIC), which is described in detail in Chapters 2 and 4. The relative diversity of the student body within UMCES, coupled with its reversed male:female ratio relative to the faculty, has led the students to be leading advocates for both racial and gender equity in the institution. Student representatives are enthusiastic participants in the DEIC and are driving change – most notably our newly adopted *Code of Conduct*.

Accreditation

From 1978 through 2013, graduate students advised by UMCES faculty members received MS and PhD degrees from other degree-granting institutions of the USM, primarily UMCP. Although the diplomas of these earlier students and graduates do not formally carry the UMCES institutional seal, the students carry the influence of the UMCES faculty in their training, their research activities, and ultimately in their professional careers.

However, UMCES leadership and faculty desired more control over their students' education, more credit for the effort UMCES invested in education, and access to



48% of UMCES graduates responded to the survey

Figure I.4 – Initial student employment profile 2015-2020, based on exit surveys conducted annually.

Group	Caucasian	African American	Asian & Pacific Islander	Hispanic	Native American	Other or No Data	Male	Female
Students	59%	6%	22%	5%	0%	8%	33%	67%
Faculty	85%	0%	9%	1%	0%	5%	65%	35%
UMCES Employees	68%	4%	11%	5%	<1%	12%	42%	58%
Maryland	50%	31%	7%	9%	1%	2%	48%	52%

Table I.2 – Percentage Racial/Ethnic and Gender Composition of UMCES Students, Faculty, and Employees compared to the Maryland population in 2020. Maryland values from Census.gov.

funding sources only available to accredited institutions. In 2012, led by former UMCES President Dr. Donald Boesch, UMCES began the process of seeking its own graduate degree-granting authority and accreditation. UMCES was granted authority by the Maryland General Assembly to “award graduate degrees in marine and environmental sciences jointly with another public sector higher education institution and award post-baccalaureate certificates.” (*Maryland House Bill 268; UMCES Joint Degree 2013 (COMAR)*). This legislation followed several bilateral agreements between UMCES and UMCP. Subsequently, the USM BOR authorized UMCES to seek accreditation through the Middle States Commission on Higher Education (MSCHE).

UMCES initiated its accreditation application immediately following the BOR’s decision, led by then Vice President for Education (VPE) Professor Edward Houde with the help of many others in the UMCES Community. UMCES completed the applicant phase and became a candidate for accreditation in November 2013. A Self-Study was submitted to MSCHE in October 2015. Following a successful Accreditation Evaluation Team visit in November 2015, UMCES received accreditation from MSCHE in March 2016. In its Accreditation Letter (*MSCHE Initial Accreditation Letter_UMCES*), MSCHE requested that UMCES follow up with a Progress Report in April 2018. Specifically, MSCHE requested UMCES document further implementation and evidence of institutional assessment results, as well as clearly articulated statements of expected student learning outcomes. The Progress Report (*UMCES Accreditation Progress Report March 2018*) was submitted under the direction of current VPE Professor Lawrence Sanford and was approved in June 2018 (*MSCHE statement of accreditation status July 2018*). Immediately afterwards, UMCES began the process of preparing its Self-Study for Reaffirmation of Accreditation to be submitted in fall 2020. The COVID-19 pandemic delayed the submittal date of the UMCES’s Self-Study to summer 2021, at the invitation of MSCHE. The MSCHE Evaluation Team visit to UMCES is scheduled to be conducted virtually in October 2021.

Changes Since 2015

Many changes have transpired since the UMCES 2015 Accreditation Self-Study. There have been changes in UMCES leadership, faculty, graduate student support, education organization, curriculum, institutional assessment and planning, and Diversity, Equity, and Inclusion activities. There have also been changes in the leadership of the MEES program at UMCP. These changes have been handled without disruption. If anything, UMCES programs and operations have become more sophisticated, more detailed, and more effective through this period. This section summarizes the changes that have occurred and their status.

Important changes in UMCES senior leadership in the last six years have occurred without any loss of continuity in operations. A nationwide search led to the appointment of Dr. Peter Goodwin as the new President of UMCES after his predecessor Dr. Donald Boesch stepped down in September 2017 after 27 years as President. Dr. Goodwin assumed the UMCES Presidency in September 2017, taking over in a smooth transition of authority from Dr. Boesch. UMCES Vice President for Advancement, Mr. David Balcolm, stepped down in January 2018. The position was recast as Vice President for Strategic Initiatives (VPSI) and filled after a national search in 2019 by Mr. Stuart Clarke, former director of the Town Creek Foundation in Oxford, MD. In August 2021 VPSI Clarke stepped down unexpectedly to take an opportunity with the William Penn Foundation in Philadelphia. UMCES is currently evaluating how this opening may be restructured and filled. UMCES Vice President for Administration (VPA) Ms. Erica Kropp retired at the end of 2015 and was replaced by Ms. Lynn Rehn, who returned to UMCES having previously served as Comptroller, and brought many years of administrative experience in the USM (including previous service at UMCP and UMBC). Including changes in the VPE office described below, there has been a 40% turnover of UMCES senior leadership in 6 years.

UMCES VPE Professor Edward Houde retired in July 2016 and was immediately replaced by Professor Lawrence Sanford. The UMCES VPE appointment is half-time; Dr. Sanford retains a half-time regular faculty appointment as Professor at UMCES Horn Point Laboratory. A full-time Administrative Assistant, Ms. Amy Griffin, supports the VPE office. Ms. Griffin also worked with Dr. Houde, and her experience facilitated the VPE leadership transition and continued smooth operation of the office. Dr. Denise Yost joined UMCES in January 2020 as Director of Graduate Certificate Programs and Extended Studies. She left UMCES at the end of 2020 and was replaced on an interim basis by Mr. Richard Arnold, an UMCES MEES alumnus on detail from NASA.

UMCES has experienced significant faculty turnover recently, with 10 faculty members (14% of UMCES faculty) retiring since early 2016, 9 of whom have been awarded Emeritus status and 7 of whom remain active in research and/or advising. UMCES has appointed 16 new faculty members since 2016. Most of these appointments have been at junior faculty levels in key areas of the Environmental Sciences. Seven of the 16 new faculty are female, slightly improving UMCES gender balance. New faculty members have brought with them state-of-the-art approaches to Environmental Science and a contagious enthusiasm for graduate education, research, outreach, and service. Most are teaching and advising graduate students, and some have already graduated students. The UMCES faculty is described in detail in Chapter 3.

Support for UMCES graduate students and their involvement in shared governance have increased markedly since 2016. Starting in 2016 the VPE office has organized UMCES-wide new student orientations immediately before the beginning of the fall semester. Students continue to receive location-specific orientation at each laboratory and also receive MEES Program orientation. The VPE office has compiled a major update of the UMCES Graduate Student Handbook and has contributed to both the UMCES and MEES websites. The VPE office is also collecting and archiving data on UMCES students' progress on a regular basis, rather than relying only on the MEES office, and is developing its own alumni database. UMCES has made deliberate efforts to engender a sense of a unified graduate student body since the 2015 Self-Study, which is challenging but critically important given the dispersed locations of our Laboratories. The UMCES Graduate Student Council (GSC), with two representatives from each Laboratory, meets regularly and has advanced several new initiatives. The chair of the GSC now participates in UMCES Administrative Council, Faculty Senate, and Graduate Faculty Council meetings. The VPE office has provided support and record-keeping for Graduate Student Council meetings and activities. Among its activities, the GSC has been directly involved in efforts to improve access to mental health care for UMCES employees, in efforts to establish an UMCES Ombuds Program, in the work of the UMCES DEIC, and in establishing annual UMCES awards for student service and faculty mentoring. Support

for UMCES's graduate student experiences is described in detail in Chapter 4 and student participation in shared governance is described in detail in Chapter 7.

Significant changes in graduate education programs and administration have occurred at UMCES since 2015. CBL Director Thomas Miller led a MEES-wide committee of faculty, including many UMCES representatives, to propose a new MEES Curriculum, with work proceeding in parallel with preparation of the UMCES 2015 Self-Study. The New MEES Curriculum was formally approved by the USM and UMCP Administrations in December 2015 and was implemented in fall 2016. UMCES played a major role in its implementation, primarily because UMCES faculty organized and taught almost all of the new courses in the new curriculum. The UMCES Programs, Courses and Curricula (PCC) Committee, which was established in 2017 based on a recommendation of our 2015 self-study, has been central in this process. The VPE Office and the PCC committee have worked diligently to 1) organize UMCES courses, 2) standardize course descriptions and syllabi, 3) establish a regular 2-year UMCES course rotation, 4) coordinate a new type of regularly scheduled courses known as Issue Study Groups, 5) support the new Environment and Society Foundation, 6) develop an UMCES Course Catalog, and 7) aid in establishing stable course schedules. These efforts are described in detail in Chapter 3.

The other major change in graduate education at UMCES since 2016 was the establishment of a Learning Outcomes Assessment (LOA) committee to implement a new LOA program, starting with MEES. A plan for such a program was presented in the UMCES 2018 MSCHE Progress Report in response to a recommendation of the 2015 MSCHE Evaluation Team. The LOA committee was established at UMCES in 2019 and quickly morphed into a MEES LOA committee through inclusion of faculty from other MEES partner campuses. The committee has developed specific LOA procedures at the student, course, and program levels, and is now considering LOA at the institutional level. The MEES LOA effort has become a pilot program for the UMCP Graduate School, as well. These efforts are described in detail in Chapter 5.

The MEES Office at UMCP also had personnel turnover and revamping, beginning in 2019. Dr. Timothy Canty replaced Dr. Kennedy Paynter as MEES Program Director in mid-2019. Dr. Canty holds a 25% administrative appointment as MEES Director. Ms. Tammy Hendershot took over from Ms. Sandy Davis as part-time Program Administrator in late 2019. Ms. Hang Nguyen was hired as Program Assistant in late 2019. Assisted by outgoing MEES personnel and the UMCES VPE Office, they were able to come up to speed rapidly. The multiple close links between UMCES and MEES (Figure I.3) greatly facilitated cooperation.

The 2015 UMCES Accreditation Evaluation Team had recommended that UMCES begin an intentional, ongoing process of Institutional Assessment. While UMCES has a long history of assessment, there was no overall,

integrated institutional assessment prior to the 2015 Self-Study and there is no UMCE Office of Institutional Assessment. In its 2018 MSCHE Progress Report, UMCE proposed a novel form of Institutional Assessment that was implemented soon after it was approved by MSCHE. The IAN group in UMCE has developed and implemented a report-card approach for environmental issues in numerous global applications and has recently applied this assessment approach to evaluate its own functioning. In 2018, UMCE adopted the IAN approach, developing and implementing the first UMCE Institutional Assessment Report Card. A second report card is scheduled for Spring 2022. The Report Card process and its results are described in detail in Chapter 6.

The UMCE 2018 Institutional Assessment informed the *UMCE 2019 Strategic Initiatives* document, which consists of a short, brochure-style statement of near-term institutional goals and initiatives. This strategic document was developed in 2018-19 instead of the typical 6-year UMCE Strategic Plan, as a placeholder until a new USM Strategic Plan is released in 2022. The Strategic Initiatives were developed with input from the UMCE Community and were launched with a public symposium for all UMCE constituencies in 2018. The Strategic Initiatives are a very succinct, but complete, outwardly facing representation of new directions and existing strengths in UMCE. UMCE Strategic Initiatives are described in detail in Chapters 1 and 6.

Finally, increasing Diversity, Equity, and Inclusion at UMCE units was brought into sharper focus by the landmark publication in 2018 demonstrating no progress nationwide on diversity in 40 years in the earth, atmospheric, and ocean sciences (*Bernard and Cooperdock 2018*). This focus was heightened following the murder of George Floyd in 2020. UMCE established its DEIC in June 2020, as an effort to coordinate activities at its different units and promote institution-wide initiatives. The DEIC and its efforts are described in detail in Chapters 2 and 4.

Extended Education and Certificate Programs

In its *2015 Accreditation Self-Study*, UMCE aspired “to develop and implement professional certificate programs in the marine and environmental sciences over the next five years”, building on the previous efforts of Professor Victor Kennedy and then-VPE Dr. Houde. Work proceeded in the background from 2016 through 2019, investigating four possible outcomes including traditional 12 credit Graduate Certificates, non-thesis or professional Masters programs, continuing education units for regional professionals, and non-credit professional development short courses. UMCE appointed Dr. Denise Yost as its Director of Graduate Certificate Programs and Extended Studies in January 2020. She immediately began a more focused effort, including contracting for a regional marketing study and contacting potential partner institutions. The COVID-19 pandemic significantly

disrupted her efforts, as she turned her attention to working with USM colleagues using her pedagogical expertise to promote effective distance education practices. UMCE benefited from these efforts, but extended education progress lagged. Dr. Yost resigned at the end of 2020 to take a new position outside the USM. She was replaced on an interim basis by Mr. Richard Arnold, an UMCE MEES alumnus on detail from NASA, who has continued working with USM partners exploring various program possibilities in early 2021.

At present, UMCE is actively pursuing three nascent extended education programs. The first, which is currently underway, is a series of four EdX courses created from an existing UMCE/MEES course by Dr. William Dennison and Mr. Arnold and leading to an available non-credit Professional Certificate in Science for Environmental Management. The initial course has been certified for teacher continuing education in Maryland. The second is a cooperative 5-year combined BS/MS program between FSU and UMCE, also led by Mr. Arnold. The third is a cooperative online graduate certificate in Sustainable Watershed Management between the University of Maryland Global Campus (UMGC) and UMCE. We are exploring other possibilities with departments at UMCP as well. Because of the early stages of development of these extended education programs, they are not discussed further in this self-study. Nevertheless, work on their development is proceeding actively.

Development and Structure of this Self-Study

Preparations for UMCE Reaffirmation of Accreditation efforts began in earnest in December 2018, when VPE Sanford and VPE Assistant Griffin attended the MSCHE Self-Study Institute in Philadelphia. The new Self-Study was announced by President Goodwin in January 2019. Sanford, Griffin, and UMCE VPA Rehn met with MSCHE Liaison Dr. Hilda Colon-Plumey in February 2019 and began organizing the effort shortly thereafter. During the first half of 2019, UMCE appointed a Self-Study Steering Committee, Working Group (WG) Chairs and WG Members, and began drafting its Self-Study Design. The membership of the various committees is listed in Appendix A. A draft Design was sent to Dr. Colon-Plumey in August 2019 and she visited UMCE in September 2019. Based on her feedback, which primarily emphasized more focused questions within the WGs, work on the Self-Study itself began in October 2019. Dr. Colon-Plumey stepped down from her role as UMCE MSCHE liaison in mid-2020 and Dr. Paul Starkey took her place. UMCE Self-Study leadership has benefited from several meetings with him in the past year.

UMCE has chosen to carry out its Self-Study using a Standards-based approach. Thus, there are 7 primary chapters in the Self-Study, each numbered for the Standard it addresses. Each WG addressed from 5-9 questions designed to elicit an evidence-supported narrative that would fully assess the extent to which

UMCES meets the relevant Standard; these questions are listed at the beginning of each chapter and answered in sequence through the chapter. A section on the impacts of the COVID pandemic follows, where relevant. Conclusions and recommendations complete each chapter. The relationships between each MSCHE Standard-based chapter, UMCES Institutional Priorities, Requirements of Affiliation, Verification of Compliance, and the other chapters are summarized in Table I.1.

Although the WG Chairs were senior administrators and/or Professors, membership of each WG was drawn from the full spectrum of UMCES employees, including students. WGs designed their own approaches, but most WGs met several times throughout 2020 and worked collaboratively via Google Drive; individual WG approaches are briefly summarized at the beginning of each chapter. All Chairs jointly met with the VPE Office bimonthly, mostly in association with UMCES Administrative Council meetings. These meetings effectively directed preparation of UMCES Self-Study. Other members of the Steering Committee contributed primarily in a review and oversight capacity. In addition, Self-Study Co-Chair Rehn became Co-Chair of WG6 to utilize her expertise as VP for Administration. The VPE Office took primary responsibility for day-to-day operation of the Self-Study process. VPE Assistant Griffin took primary responsibility for assembling and organizing the Evidence Inventory.

Priorities and Standards

	Priority 1: Scientific research to support resilient & sustainable ecosystems	Priority 2: Expanded, transformative educational programs	Priority 3: Enhanced engagement with policy-makers and communities	Priority 4: Increase diversity, equity, and inclusion in a supportive environment	Priority 5: Promotion of environmental entrepreneurship	Requirements of Affiliation and/or Verification of Compliance	Connections Direct, (Indirect)
Standard I. Mission and Goals	X	X	X	X	X	7,10	2–7
Standard II. Ethics and Integrity	X	X	X	X	X	Verification of Compliance	1, 3, 7 (4–6)
Standard III. Design and Delivery of the Student Learning Experience	X	X	(X)		(X)	8, 9, 10, 15	4, 5 (1, 2, 6, 7)
Standard IV. Support of the Student Learning Experience		X	(X)	X	(X)	8,10	2, 3, 7 (1, 5, 6)
Standard V. Education Effectiveness Assessment	X	X				8, 9,10	1, 3 (2, 4, 6, 7)
Standard VI. Planning, Resources, and Administration	X	X	X	X		10, 11	1, 2, 4, 7 (3, 5)
Standard VII. Governance, Leadership, and Administration	(X)	X	X	X	(X)	12, 13	1, 2, 6 (3–5)

Figure I.3 – Interrelationships within the UMCES Self-Study. Column 1 lists the MSCHE Standards and associated Chapter numbers. Columns 2-6 indicate primary and secondary relationships between each MSCHE Standard and UMCES Priorities as stated in its 2019 Strategic Initiatives; X=Primary; (X)=Secondary. Column 7 indicates the Requirements of Affiliation or Verification of Compliance most closely related to each Standard. Column 8 indicates primary and secondary relationships between the chapters: #=Primary; (#)=Secondary.

Chapter 1 *Mission and Goals*

Purpose

Standard 1: “The institution’s mission defines its purpose within the context of higher education, the students it serves, and what it intends to accomplish. The institution’s stated goals are clearly linked to its mission and specify how the institution fulfills its mission.

Working Group 1 set out to answer the following five questions related to this standard:

1. Does UMCES have a clearly defined Mission Statement, developed collaboratively with broad participation and approved by appropriate USM and State of Maryland governing bodies?
2. Are UMCES institutional goals aligned with its mission, and are they realistic, achievable, and appropriate to higher education? Are UMCES goals developed collaboratively, with broad participation, and widely disseminated?
3. Do UMCES mission and goals statements integrate academic and institutional effectiveness and improvement, support for scholarly research and its application, student achievement and learning, and the results of academic and institutional assessments?
4. Do UMCES mission and goals align equitably across all of UMCES units and encompass the needs and concerns of all UMCES constituencies?
5. How often and in what manner are UMCES’s mission and goals assessed and revised?

Scope

Primary Data and Information Sources:

We accessed the following documents known to contain statements directly or indirectly related to the UMCES mission:

1. *2019 UMCES Strategic Initiatives*
2. *2018 Code of Maryland (COMAR) mandate for UMCES*
3. *2014 and 2018 UMCES mission statements* approved by the University of Maryland Board of Regents (BOR)
4. *UMCES Annual Report, 2018*
5. *2015 UMCES Accreditation Self-Study Report*
6. *2012 UMCES Strategic Plan*

Other Data Sources and Interviews:

A search was conducted for shorter statements pertaining to mission and goals in UMCES annual reports, the UMCES web site, the 2019 UMCES Strategic Initiatives document and the 2019 draft of the UMCES Institutional Assessment. The WG also consulted the President of the UMCES Faculty Senate, the President of the UMCES Graduate Student Council, and the

UMCES Director of Communications for records they had pertaining to discussions of the UMCES mission and goals.

Was the effort sufficient:

Yes, the WG concluded that these sources of information were sufficient to answer the five self-study questions listed above.

Analysis and Problem-Solving Methods

The WG developed the five questions during a series of meetings in early 2020. The data were shared with all WG members and three teams were formed to study questions 1 & 2, 3 & 4, and 5. Each team reported to the full group in a series of virtual meetings held using the Zoom platform. The chair developed an outline of major findings from each of the three reports and shared that summary with the full WG. The WG members commented upon and edited the preliminary findings until a consensus was reached.

Results

1. Does UMCES have a clearly defined Mission Statement, developed collaboratively with broad participation and approved by appropriate USM and State of Maryland governing bodies?

UMCES mission is clearly defined at both the State and University System levels. A one-page statement of functions, duties and activities is published in the *2018 Code of Maryland Regulations (COMAR)*, Natural Resource, Title 4, Section 4, § 3-403. In addition, the University System of Maryland (USM) Board of Regents (BOR) approved an official, multi-page statement of mission and goals for UMCES in 2014 and 2018 that describes the broad participation of the parties contributing to the statement. The institutional objectives and outcomes outlined in the 2018 UMCES Mission Statement reflect and correspond with the state mandate, the USM Updated Strategic Plan (*USM Strategic Plan 2018 Update*), as well as the Maryland Higher Education Commission's Maryland State Plan for Postsecondary Education (*MHEC 2017.2021 Maryland State Plan for Higher Education*).

The first paragraph of the lengthy BOR-approved mission statement follows:

"The University of Maryland Center for Environmental Science (UMCES) is a research, education, and service institution of the University System of Maryland (USM) and a world leader in the science of coastal environments and their watersheds. UMCES faculty advance knowledge through scientific discovery, integration, application, and teaching that results in a comprehensive understanding of our environment and natural resources, helping to guide the State and world toward a more sustainable future. Through its role as the responsible institution for administration of the Maryland Sea Grant College and numerous collaborative programs with other institutions, UMCES leads, coordinates, and catalyzes environmental research and graduate education within the University System. The Integration and Application Network inspires, manages, produces and communicates timely syntheses and assessments on key environmental issues with a special emphasis on Chesapeake Bay. UMCES faculty members advise, teach, and serve as mentors to many graduate students enrolled in USM institutions, including in joint degree programs particularly through the System-wide graduate programs in Marine- Estuarine-Environmental Sciences (MEES), in which UMCES has a leading role. Through its participation in the NOAA Living Marine Cooperative Science Center, UMCES is committed to train a diverse environmental workforce. UMCES also delivers its services through environmental science education programs for K-12 students and teachers, pertinent and timely information to the general public and decision makers, technology transfer to industries, and, in collaboration with, the Maryland Sea Grant College."

The final page of the BOR-approved 2018 UMCES Mission Statement describes the broad participation of the parties contributing to the statement:

"The UMCES Mission Statement document was reviewed and approved by our UMCES Administrative Council, which includes all UMCES Executive Leaders, Administrative Directors, and the Chairs of our Faculty Senate and Graduate Student Councils. Final approval was obtained on August 24, 2018." (UMCES Mission Statement Final, 2018).

In addition, more concise unofficial mission and goal statements can be found embedded throughout the Strategic Initiatives document of 2019, which was the result of extensive discussions among faculty, students, and Board of Visitors (BOV), culminating in a conference held in November 2018. Examples of mission relevant statements in the Strategic Initiative documents include:

"The University of Maryland Center for Environmental Science (UMCES) is a world-class, independent graduate public university. UMCES provides environmental intelligence so that communities and governments can respond to a changing world."

"As Maryland's graduate university for the environment, we train students to be environmental leaders of the future." (UMCES Strategic Initiatives, 2019)

Another example of a short mission statement was produced by the developers of the UMCES web site for branding purposes:

"UMCES has a unique statutory mandate to conduct a comprehensive scientific program to develop and apply predictive ecology for the improvement and preservation of Maryland's physical environment."

Recommendations

The 2019 Strategic Initiative document and other documents have several concise and relevant passages, but a consistent, brief statement of mission and goals is lacking. The web site statement emphasizes Maryland's physical environment, whereas other statements emphasize our global and world-class perspectives.

The working group recommends that a single, very concise mission statement be developed through discussions between faculty, staff, students, the BOV, and communication experts. A clear mission statement is inspirational and easily remembered, and can be used consistently in reports, web posting, etc. In addition to annual reports and website pages, examples of documents that could benefit from being guided by a short mission and goals statement include the Student Handbook, the UMCES Program, Curricula and Courses Committee charge, the UMCES Institutional Assessment Report, and Facilities Master Plan, and materials used to recruit faculty and students.

2. Are UMCES institutional goals aligned with its mission, and are they realistic, achievable, and appropriate to higher education? Are UMCES goals developed collaboratively, with broad participation, and widely disseminated?

The working group examined the BOR-approved goals and found that they are properly aligned with UMCES's mission. It is particularly noteworthy that the BOR-approved goals are also consistent with the more recent 2019 Strategic Initiatives statement, which was developed with broad, collaborative participation of faculty, staff, students, and the BOV, through multiple meetings and draft iterations that were widely disseminated (*UMCES Strategic Initiatives, 2019*):

Goal 1. Continue to strengthen UMCES capacity for scientific discovery related to: a) genes to ecosystems diversity and conservation; b) human welfare; c) energy choices; d) water security; and, e) global reach.

Goal 2. Continue the development of UMCES's capacity for integration and application including through the Integration and Application Network (IAN) and the *National Socio Environmental Synthesis Center (SESYNC)*, which facilitates transdisciplinary integration of environmental sciences and provides a mechanism to provide scientifically sound advice to the environmental and resource management communities of the Chesapeake Bay region and beyond.

Goal 3. Build on UMCES's success in graduate education, by updating and reforming existing programs to meet the changing societal and scientific needs, competing more successfully for the most qualified students, and providing expanded opportunities for continuing professional education, including video and web-based delivery of instruction.

Goal 4. Expand the role of UMCES and the Maryland Sea Grant College in environmental education by offering hands-on experiences at the laboratories for students and teachers; contributing to teacher education; and providing state-wide leadership in the dissemination of scientifically sound information to the public.

Goal 5. Support the leadership of UMCES's faculty within the scientific community and advance environmental science and translational research within the University System of Maryland, the State, the Chesapeake Bay region, and the nation.

Recommendations

Each of the five stated goals listed above is accompanied by several indicators for progress in the BOR document. Most are realistic and achievable, but two related to diversity and inclusion have been

especially challenging and will likely require additional attention and resources to become realistic or achievable:

- Increased diversity and inclusiveness within our faculty and the student body.
- Increased enrollment of traditionally underrepresented groups within environmental science.

The working group recommends that renewed attention be given to those two indicators of progress on stated goals.

3. Do UMCES mission and goals statements integrate academic and institutional effectiveness and improvement, support for scholarly research and its application, student achievement and learning, and the results of academic and institutional assessments?

Taken together, the five UMCES goals listed above advance effectiveness and integration of scholarly research (goals 1 and 5), research application (goals 2 and 4), and student achievement and learning (goals 3 and 4). The 2018 Annual Report (*UMCES Annual Report, 2018*) and the 2019 Strategic Initiatives (*UMCES Strategic Initiatives, 2019*) statement highlight achievements related to these goals, such as:

- UMCES provides the science for policymakers to address the pressing environmental issues in our communities.
- As trusted scientific advisors, our faculty provide unbiased research to inform management decisions and public policy on pressing environmental issues in our local communities and around the globe.
- We work across disciplines and in diverse settings—from the Appalachian Mountains to the Arctic—seeking solutions that improve people's lives and sustain the natural world.
- Our renowned faculty train the next generation of environmental leaders as part of the University System of Maryland's nationally ranked graduate program in marine and environmental science.
- The University of Maryland Center for Environmental Science (UMCES) is a world-class, independent graduate public university.
- As Maryland's graduate university for the environment, we train students to be environmental leaders of the future.

Furthermore, UMCES uses the results of periodic institutional assessments of its progress toward these goals. For example, based on the 2015 UMCES Accreditation Self-Study Report (*UMCES MSCHE Self-Study 2015*), a plan was developed and described in the UMCES 2018 Accreditation Progress Report (*UMCES Accreditation Progress Report March 2018*) to further address student learning outcomes, thus advancing goal 3 on building success in graduate education (see Chapter 5). Other examples of using institutional assessments to prompt further progress on goals include recent revisions of the MEES curriculum and its core foundation courses, developing new course proposal templates and standardized outlines, producing a revised student handbook, and engaging student representation in UMCES governance meetings and issues.

Recommendations

The working group recommends that assessments continue to inform needed improvements in curriculum development, learning outcomes, and student engagement.

4. Do UMCES mission and goals align equitably across all of UMCES units and encompass the needs and concerns of all UMCES constituencies?

All of the UMCES units (the four laboratories, the Sea Grant College Program, the Integration and Application Network (IAN), and Center Administration) participated fully in the development of the 2019 Strategic Initiatives statement. Faculty, students, staff, and administrators were broadly represented in this effort and the Board of Visitors also participated (*Administrative Council Meeting Minutes March 12, 2019, Lab Visits on Strategic Initiatives*). A similar inclusive approach was used for the 2019 Institutional Assessment exercise. All voices are heard and respectfully considered in these processes (*UMCES Institutional Assessment Methods (updated)*).

Each unit has its own strategic plan, all of which are fully compliant and compatible with the UMCES Strategic Plan. The unit strategic plans emphasize the particular strengths and needs of that unit within the broader UMCES community. Issues of sustainability and of diversity and inclusion vary according to different histories, infrastructures, and regional challenges.

Recommendations

UMCES mission and goals align equitably across UMCES units and encompass the needs and concerns of multiple UMCES constituencies.

The working group recommends that the units work together from the bottom up to develop a matrix of statements and evidence of how each unit is contributing to each of the broader UMCES missions and goals.

This effort may reveal synergies and gaps where better coordination among the units could help advance the UMCES mission and goals. Working at local levels and then comparing to other units and the whole community may also elevate some voices and opinions that could be overlooked in the present more top-down assessment strategy.

5. How often and in what manner are UMCES mission and goals assessed and revised?

UMCES mission and goals statements are assessed and revised with sufficient frequency and broad engagement on various time cycles. Updating the mission statement is required by Maryland Higher Education Commission (MHEC) at least every four years (*MHEC Mission Statement Review - 2013*).

The process of amending and updating the Mission Statement is initiated by the President of UMCES. Drafts are provided for review by the UMCES community through the established shared governance representation on the President's Executive Council and Administrative Council before the draft Mission Statement goes forward to the USM for review by the Chancellor and before being submitted to the USM BoR for its consideration and approval (*Board of Regents Mission Statement Review - Presentation Schedule & Timeline-2014*). Lastly, MHEC reviews mission statements for consistency with the state plan, provides feedback, and requests clarification as necessary (*MHEC Request to Complete Mission Statement Submission - 11.25.18 - Final, UMCES Mission Statement Comments Response 12-18 to USM_MHEC final*).

The BOR approved the UMCES mission and goals statement in 2014 and 2018. According to the 2018 BOR-approved mission statement, there are two processes whereby the mission and goals are to be periodically reviewed: (1) Revision of a strategic plan on approximately a 6-year interval; and (2) the UMCES Institutional Assessment, which is to occur on a two year cycle and which feeds into the MSCHE accreditation process (*UMCES Mission Statement Final, 2018*).

The last UMCES strategic plan was published in 2012 (*UMCES Strategic Plan, 2012*). A more recent revision has been postponed to await the strategic planning process of the USM. In the meantime, however, the UMCES Strategic Initiatives statement of 2019 served as a periodic review of mission and goals (*UMCES Strategic Initiatives, 2019*). It is more concise and "high-level" than a typical strategic plan, but it succeeded in engaging the entire community in reviewing and updating goals and aspirations (*Administrative Council Meeting Minutes March 12, 2019, Lab Visits on Strategic Initiatives*).

In 2018, UMCES adopted an innovative "report card"

process for its periodic Institutional Assessment. The IAN unit has extensive experience in report card assessments, and it led this effort. This assessment started as an internal feedback process that included the entire campus community, assessing what UMCES's priorities should be, what we are doing well and what we need to improve, and how we achieve success in these areas (*UMCES Institutional Assessment, 2018*).

Recommendations

The working group recommends that an external assessment group be included periodically (e.g., every fourth two-year assessment) in the UMCES Institutional Assessment process (see Chapter 6). It also recommends establishing a more formal process for evaluating progress in achieving the stated mission and goals.

Covid-19 Impacts

None.

Connections

The findings of this working group provide the foundation for all the other working groups to evaluate how well UMCES is meeting its statements of mission and related goals.

Conclusions and Recommendations

The WG found that UMCES complies with Standard 1 by maintaining and regularly (every four years by the BOR and every two years by the UMCES Internal Assessment) updating a mission statement and related goals that are approved by its governing board and that define its purposes within the context of higher education. UMCES uses institutional planning to update and integrate goals for academic and institutional effectiveness and improvement, student achievement of educational goals, student learning, and the results of academic and institutional assessments. UMCES's mission and goals align equitably across UMCES units and encompass the needs and concerns of multiple UMCES constituencies.

Statements of mission, functions, duties and activities are published in UMCES enabling legislation (*Maryland House Bill 268; UMCES Joint Degree 2013 (COMAR)*). The University System of Maryland (USM) Board of Regents (BOR) approved an official, multi-page statement of mission and goals for UMCES in 2014 and 2018, which also describes the broad participation of the parties contributing to the statement. The BOR-approved goals are properly aligned with the UMCES mission. The UMCES goals advance effectiveness and integration of scholarly research, research application, and student achievement and learning. The mission and goals statements are assessed and revised with sufficient frequency and broad engagement.

The working group recommends that a single, very concise mission statement be developed through discussions of faculty, staff, students, BOV, and communication experts and then used consistently in reports, web posting, etc., and easily committed to memory. The WG also recommends new attention be given to progress on goals of increased diversity and inclusiveness within our faculty, staff, and the student body and increased enrollment of traditionally underrepresented groups within environmental science. The working group recommends that the units work together from the bottom up to develop a matrix of statements and evidence of how each unit is contributing to each of the broader UMCES missions and goals. Finally, the working group recommends that an external assessment group be included periodically in the UMCES Institutional Assessment process (see Chapter 6). It also recommends establishing a more formal process for evaluating progress in achieving the stated mission and goals.

Chapter 2 *Ethics and Integrity*

Purpose

The University of Maryland Center for Environmental Science (UMCES) strives to be an open and transparent institution that maintains the highest standards of ethics and integrity. UMCES leadership sets high standards for itself and is aware that the performance of leadership sets the tone and serves as an example for all UMCES faculty, staff and students. The consolidated policies of UMCES and the University System of Maryland (USM) address legal, ethical and research compliance matters.

In this chapter, the Ethics and Integrity Working Group reviews current policies and procedures relevant to the criteria for Standard II outlined by the Middle States Commission on Higher Education (MSCHE) and makes recommendations for the future. MSCHE Standard II states “Ethics and integrity are central, indispensable, and defining hallmarks of effective higher education institutions. In all activities, whether internal or external, an institution must be faithful to its mission, honor its contracts and commitments, adhere to its policies, and represent itself truthfully.”

Eight questions were posed to address all areas of ethics and integrity, including academic freedom, protection of intellectual property, procedures for addressing grievances, hiring and promotion policies and conflict of interest. The eight questions addressed were:

1. How does UMCES promote and protect academic and intellectual freedom? What processes are in place to ensure that the intellectual property of others is respected and that UMCES’s intellectual property is protected and any returns are equitably shared?
2. How does UMCES demonstrate and promote transparency, honesty, and integrity in dealing with internal and external constituencies?
3. Are reasonable and adequate procedures in place to address grievances for all UMCES constituents? Is UMCES responsive and fair in addressing grievances?
4. How does UMCES manage its operations and those of its employees to avoid conflicts of interest and/or the appearance of conflicts of interest?
5. How does UMCES ensure integrity in its hiring, merit, retention, and dismissal procedures of faculty, students, and staff?
6. How does UMCES promote inclusion and diversity?
7. Does UMCES have a good record of compliance with all reporting requirements?
8. What mechanisms are in place to periodically assess UMCES’s ethics and integrity standards?

Scope

The primary data source was the *UMCES Policies and Procedures*, in which these areas are addressed specifically and in detail. The UMCES Policies and Procedures are consistent with, and generally more detailed than, the overarching USM Policies and Procedures, which also apply to our institution.

Additional data were collected in a few specific areas, including the percentage of promotion and tenure

decisions in which there was an appeal or grievance; numbers of invention disclosures filed and patents issued; and the number and percentage of UMCES graduate students who have completed the course in Responsible Conduct of Research. The effort was considered to be ample to address seven of the eight questions. Insufficient information was found to address the eighth question on assuring periodic assessment of UMCES’s ethics and integrity standards. A new procedure is recommended to address this issue.

Analysis and Problem-Solving Methods

Each member of the working group took the lead in addressing one question. The previous UMCES self-study was used as a primary source on which to build. USM and UMCES policies were carefully reviewed to determine how policies informed each of the questions. Specific data were compiled from UMCES primary data sources with assistance from UMCES administrators when necessary, for example to determine numbers of grievances and outcomes of grievance actions.

USM and UMCES policies were reviewed to determine if there were clearly stated guidelines regarding MSCHE's criteria. Additional data was used to determine if the processes in place were being appropriately used to ensure the integrity of our institution. The Accreditation Steering Committee served as an expert group with broad competence to review the Ethics and Integrity standard.

Results

1. How does UMCES promote and protect academic and intellectual freedom? What processes are in place to ensure that the intellectual property of others is respected and that UMCES's intellectual property is protected and any returns equitably shared?

UMCES actively promotes academic freedom, ensures that others' intellectual property is protected, and protects the intellectual property of UMCES researchers. The UMCES Mission Statement (*UMCES Mission Statement Final, 2018*) includes the statement that "UMCES is an independent institution responsible for generating unbiased science and plays a key role in advancing knowledge in support of Maryland's international reputation for progressive environmental management and sustainable economic development." Academic freedom is a core value in generating unbiased science and respect for intellectual property is essential in economic development. UMCES successfully maintains high standards in promoting and protecting academic freedom. UMCES benefits in this regard from being an institution within the USM that has overarching policies on academic and intellectual freedom.

Academic and intellectual freedom is protected by the active participation of all members of the UMCES community. Shared governance is strong within UMCES, as acknowledged by the USM assessment of shared governance within each of the 12 institutions within the USM (*State of Shared Governance Report 2019*). UMCES has a formal policy on shared governance (*UMCES I-6.00 Policy on Shared Governance*) that states that "faculty, students, and staff shall participate with the administration in the shared governance of" UMCES and defines the bodies through which this governance is led. UMCES is also governed by the USM shared governance policy (*USM Policy I-6.00 Shared Governance in the University*

of Maryland System). UMCES has an active and highly engaged Faculty Senate (*UMCES Faculty Senate*) that meets regularly and is an important body in guarding the faculty's academic freedom. There is also a Staff Council (*UMCES Staff Council Website*) and a Graduate Student Council, which contribute to shared governance (*UMCES Graduate Student Council*). The UMCES Executive Council respects and protects academic freedom. The entire faculty hold open discussions on issues including academic freedom at annual Faculty Convocations.

UMCES ensures that the intellectual property of others is protected through the UMCES Policy and Procedures on Misconduct in Scholarly Work (*UMCES III-1.10 Policy and Procedures on Misconduct in Scholarly Work*), which states that there will be an investigation into reported misconduct, including plagiarism, and which outlines the disciplinary actions.

UMCES protects intellectual property developed by students, staff and faculty according to the policy on classified and proprietary work of the USM (*USM Policy on Classified and Proprietary Work IV-2.20*) and the USM policy on intellectual property (*USM Policy on Intellectual Property IV-3.20*). It would be a poor use of resources for an institution of UMCES's size to maintain its own Office of Technology Development (OTD). Rather, UMCES draws on the expertise of the OTD at the University of Maryland, Baltimore County (UMBC), a large partner institution in the USM. Terms of the UMBC OTD technical transfer services related to patenting, marketing and licensing of UMCES intellectual property are laid out in an Inter-Institutional Agreement (Inter Institutional Agreement for IP Tech Development between UMBC and UMCES). Returns are equitably shared as laid out by the University System of Maryland Policy on Intellectual Property (USM Policy on Intellectual Property IV-3.20, especially section XI Revenue Sharing). The general principle is that net revenue is shared with 50% going to the University and 50% to the inventors, after payment of general and project specific costs.

2. How does UMCES demonstrate and promote transparency, honesty, and integrity in dealing with internal and external constituencies?

UMCES has a record of promoting transparency, honesty, and integrity regarding our research, hiring, education and policies. UMCES has a comprehensive website and a Director of Communications who ensures that noteworthy events and achievements are shared widely with internal and external constituencies and who can answer inquiries from outside constituencies. Other materials, including regular email newsletters (for example, see the *ENVIRONMENTAL INSIGHTS APRIL 2021* issue), the UMCES Annual Report (*UMCES 2019 Annual Report*) and the Strategic Initiatives (*UMCES Strategic Initiatives, 2019*), provide the public with information about current research at UMCES and future directions.

Information on policies, procedures and organizational changes are announced to internal constituents by email and are also discussed at bi-monthly Administrative Council meetings so that key administrative staff are fully informed and can disseminate information accurately and authoritatively within their units.

UMCES President Goodwin sets the highest ethical standards and regularly emphasizes the importance of honesty and transparency to all senior leadership. UMCES promotes and actively teaches graduate students in the Marine-Estuarine Environmental Science (MEES) program the importance of high ethical standards through a recommended class in Responsible Conduct of Research (*MEES608B Responsible Conduct of Research Syllabus*). Students are also offered the professional development class MEES618D “Ethical Aspects of Environmental Science” (*MEES618D Ethical Aspects of Environmental Science Syllabus*).

Several documents detail policies and procedures to promote transparency, honesty, and integrity at UMCES. These include the UMCES Organizational Chart (see Figure I.2), which provides an overview of individuals’ responsibilities, the UMCES Student Handbook (*UMCES Student Handbook, 2020- 2021, section III page 15*), which includes a section on Ethics and Integrity policies, and the UMCES Policies and Procedures compendium (*UMCES Policies and Procedures*), which provides a clear statement of all of UMCES policies, many of which are relevant to transparency, honesty and integrity. All of these are publicly available so that current and prospective members of the UMCES community and the general public can review UMCES’s policies.

3. Are reasonable and adequate procedures in place to address grievances for all UMCES constituents? Is UMCES responsive and fair in addressing grievances?

UMCES has clear procedures in place for addressing grievances and has a track record of appropriate responses to grievances. All UMCES faculty, staff and students may raise concerns regarding fraud or fiscal irregularities through the confidential USM hot-line mechanism under USM Policy VIII-7.10 (*UMCES VII-7.10 Policy and Procedures on Reporting Suspected or Known Fiscal Irregularities*). UMCES guidance expands this process to consider a wide range of misconduct (UMCES Guidance for the communication of suspected unethical or illegal conduct) summarized in Summary of guidance (*Summary of UMCES Guidance for the Communication of Suspected Unethical or Illegal Conduct*) and provides whistleblower protections.

UMCES policies on grievances are contained in Section III-9 of the UMCES Policies and Procedures Manual. Faculty members may file a Grievance form (*UMCES Formal Request, Problem, Complaint, or Grievance Form*)

to register a complaint and have multiple opportunities to appeal decisions. Graduate Assistants may also submit grievances through the process outlined in the UMCES Policy on Graduate Assistantships (*UMCES Policy III-7.11 Graduate Assistantships*). Staff may report grievances according to the USM Policy on Grievances (*USM Policy on Grievances for Nonexempt and Exempt Staff Employees VII-8.00*).

UMCES has policies on sexual misconduct that include clear processes for making complaints and addressing complaints (*UMCES VI-1.60 Policy and Procedure on Sexual Misconduct, section VII on trainings*). Employees are informed of our policies and how to make a complaint through a sexual harassment training, which is required for new employees and at least once every two years for current employees.

UMCES is committed to fair treatment of graduate students. The UMCES policy on graduate assistantships (*UMCES Policy III-7.11 Graduate Assistantships*) recognizes that the purpose of a graduate assistantship is to advance the student’s graduate education by providing experience in teaching and research, while providing financial support. This policy provides detailed guidance on due process and grievance procedures, including an informal and formal grievance process. UMCES students occasionally serve as TAs or GAs at the University of Maryland College Park (UMCP), for the duration of which service they fall under the UMCP Graduate School Policies for Graduate Assistantships (*UMD Graduate Assistant Policies*).

Recommendations

While UMCES has adequate procedures for addressing grievances, our review revealed that there is a need for an ombudsperson to assist in the investigation and resolution of grievances. An ad hoc committee of administrators, faculty, staff, and students chaired by the Executive Assistant to the President has already begun the process of creating an ombudsperson system. The *UMCES Diversity, Equity, and Inclusion Collaborative (DEIC)* (below, Question 6) has set the creation of an Ombuds function as a priority for UMCES.

4. How does UMCES manage its operations and those of its employees so as to avoid conflicts of interest and/or the appearance of conflicts of interest?

UMCES has sound policies and procedures in place to manage potential conflicts of interest. UMCES faculty, staff and students are proud of the stellar reputation of UMCES in terms of academic and research integrity. At a time when the public perception of science integrity may finally be on an upswing (*Pew Research Center: Trust and Mistrust in Americans’ Views of Scientific Experts*), it is critically important that scientists maintain the highest levels of integrity and avoid conflicts of interest or the appearance of such conflicts.

UMCES's scientific mission is positively advanced when faculty, staff and students forge collaborative links related to their professional expertise, with other experts and stake-holders outside the University that facilitate research or management goals (e.g. other scholars, consultants). UMCES specifically recognizes that despite the positive value of these interactions, sometimes conflicts, or perception of conflict, can arise that may damage the reputation of an individual and/or the institution. Therefore, UMCES has a very clearly articulated policy and procedures (*UMCES II-3.10 Policy on Conflict of Interest and Conflict of Commitment*), relating to conflicts of interest and conflicts of commitment, which guide our scientists. All pertinent personnel are briefed on these guidelines when hired.

UMCES provides clear guidance on processes for scientists who engage in outside consulting activities. UMCES faculty and staff are required to complete an Annual Report of Consulting & Outside Professional Activities as part of the annual review process that is managed by the UMCES Unit Directors and by the President's Office in the case of Unit Directors (*UMCES Guidance in Brief: Consulting*).

If an activity or relationship involves the potential for either an actual or perceived conflict of interest, the faculty or staff member must complete a Conflict of Interest (COI) Form, downloadable from the UMCES website (*UMCES Research and Development Interest Disclosure Form*), describing how that COI will be mitigated. The COI form is reviewed by a COI Committee chaired by the UMCES VP Administration and composed of a group of UMCES faculty and administrators, convened ad hoc as needed by the Vice President for Administration. The COI evaluation process culminates in a written decision of approval or disapproval of the mitigation plan from the UMCES President, upon recommendation from the COI Committee, to the faculty or staff member. Each quarter the Director of the Office of Research Administration and Advancement (ORAA) submits a report of COI activity to the Chancellor and the State Ethics Commission. If disclosures have been made for that quarter, copies of all relevant documentation are provided to those respective offices.

5. How does UMCES ensure integrity in its hiring, merit, retention, and dismissal procedures of faculty, students, and staff?

UMCES has clearly outlined policies for recruiting and managing personnel so as to ensure fairness and integrity. The effective recruitment and retention of graduate students, faculty and staff is a lynchpin of UMCES's success.

Student applications are reviewed by the relevant Foundation Area committee of the MEES Program that includes faculty members from other institutions who are partners in the MEES Program. UMCES has an excellent

graduate student retention and graduation rate (*UMCES Student Outcomes, 2020, page 5, and see Introduction*). Dismissal of graduate students is extremely rare. Situations where students may be dismissed are outlined in the UMD Graduate School Academic Policies (*UMD Academic Record*).

Any available positions at UMCES are advertised on the UMCES website and widely disseminated, including through media likely to reach a diverse audience. UMCES is an equal opportunity employer and has developed policies pursuant to that designation (e.g. *UMCES Policy VII.1.01 Recruitment and Selection of Non-Faculty*). UMCES's policy on recruitment and selection of non-faculty requires that there will be a search committee, usually including the immediate supervisor of the posted position. There are also clear policies for the separation of staff members (*UMCES VII-1.22 Policy on Separation for Regular Exempt Employees*). Policies on Contingent Status Employment for Nonexempt and Exempt Staff Employees are also clearly defined (*UMCES VII-1.40 Policy on Contingent Status Employment for Nonexempt and Exempt Staff Employees*).

UMCES has policies for the appointment, promotion, and tenure of faculty that ensure fairness in recruitment and excellence among our faculty (*UMCES Policy II-1.00 Appointment, Promotion, and Tenure of Faculty*). The faculty appointment process is designed to create equal opportunity for all applicants. It is managed by a Faculty Search Committee, which makes recommendations to the unit director and UMCES President. This committee has expertise in the appointment's field, making it a sound judge of the applicants' qualifications. Decisions for promotion and tenure are based on demonstrated performance in scientific discovery, integration, application, and teaching and advisement. Timelines and specific procedures for varying situations are clearly addressed in UMCES's policies. In the five years from 2015-2020, UMCES has had no appeals out of 24 promotion and/or tenure reviews.

6. How does UMCES promote inclusion and diversity?

One way in which UMCES promotes diversity and inclusion is by encouraging and supporting grants aimed at increasing diversity in the sciences. This work is enhanced through cooperation with collaborative committees established to create comprehensive plans for diversity, equity, inclusion, and justice (DEIJ). For example, UMCES faculty members are involved in the project "GP-IMPACT: Pathways TO RENEW: Tropical Oceanography Research Experiences for the Next-Generation Workforce," funded by the National Science Foundation (NSF) (*NSF Report 2020: GP-IMPACT: Pathways TO RENEW: Tropical Oceanography Research Experiences for the Next-Generation Workforce*) This project seeks to close the opportunity gap and enhance science, technology, engineering and mathematics

(STEM) retention for underrepresented groups at primarily non-research colleges and universities. The program has established the Tropical Oceanography Research Training for Undergraduate Academics (TORTUGA) Center to introduce early- through advanced-stage undergraduate students from Puerto Rico to geoscience education and research.

Another example of a long-standing grant-supported UMCEs diversity program is the Living Marine Resources Cooperative Science Center (*NOAA LMRCSC*), which has been coordinated at UMCEs for the past two decades by IMET faculty member Professor Jagus. This program is funded by the National Oceanic and Atmospheric Administration (NOAA) and is based at the University of Maryland Eastern Shore (UMES), a Historically Black College or University (HBCU). With the goal of increasing diversity in the sciences, LMRCSC has supported graduate students in UMCEs laboratories and undergraduate interns at IMET. Through this program and other research collaborations and student committees, UMCEs has established a strong relationship with UMES.

UMCEs leadership, including faculty, staff and student representatives, met with Diversity and Inclusion leaders at UMBC during 2019 to seek advice and input from UMBC, a nationally recognized leader in diversity issues in academia. The UMBC delegation included President Freeman Hrabowski and Provost Phillip Rous. This delegation recommended emphasizing diversity and inclusion issues in every level of the organization rather than creating a separate Office of Diversity and Inclusion. They also recommended diversifying the faculty by initiating a *"Postdoctoral Fellows for Faculty Diversity Program."* In this program, postdoctoral fellows are recruited from diverse backgrounds and provided mentoring, support and resources for two years, after which they are eligible for promotion to tenure-track assistant professor positions. IMET and CBL are actively seeking to establish similar programs.

To further coordinate and lead DEI efforts campus-wide, UMCEs established a Diversity, Equity and Inclusion Collaborative (DEIC) in 2020 (*UMCEs DEIC Charter, September 2020*). The DEIC, chaired by President Goodwin, has agreed to a charter and a code of conduct (*UMCEs Draft Code of Conduct*). It has set objectives, including three near term priorities for the DEIC and UMCEs. These three priorities are arranging an independent, anonymous Diversity, Equity, Inclusion, and Justice (DEIJ) campus climate survey; promoting an UMCEs ombuds program; and more actively addressing DEIJ in UMCEs hiring policies and procedures (*DEIC November 2020 Meeting Notes*). In addition, most UMCEs units have established local committees, such as the Horn Point Laboratory (HPL) "Diversity, Equity, and Inclusion (DEI) Committee," that are charged with developing ideas, plans and implementation strategies to increase DEIJ for HPL staff, students, faculty, post-docs and interns as well as outreach and educational opportunities for underserved local communities.

Two UMCEs Executive Council members also serve on the USM Diversity and Inclusion Council, the system-level Council that promotes and monitors diversity and inclusion issues at the twelve universities in the USM (*USM Diversity and Inclusion Council*). UMCEs submits an annual Institutional Programs of Cultural Diversity Progress Report to the USM (*UMCEs - USM Cultural Diversity Report 2021 - Full Report*) to track progress of the diversity efforts at UMCEs.

Recommendations

While there are systems in place to help UMCEs promote diversity, equity, and inclusion, more can be done. This working group recommends that the DEIC continue to plan for and implement improvements in DEIJ at UMCEs. The President's Office strongly supports the DEIC and will work to support their recommendations.

7. Does UMCEs have a good record of compliance with all reporting requirements?

UMCEs meets all Commission (*S2.C8 Verification of Compliance*), state, and federal reporting policies and requirements. For instance, an Annual Institutional Update is submitted to MSCHE to report on financials and enrollment summaries, while rates of admission and graduation/retention are regularly updated on the student consumer information page (*UMCEs Student Outcomes, 2020*). Compliance in other areas is also checked by State and USM audit processes. The Marine Estuarine Environmental Sciences Graduate Program (MEES), in which our graduate students enroll and our faculty teach, also conducted a self-study in 2008 that is publicly available (*MEES Self-Study 2008, MEES External Review and Report 2008, MEES Provost USM Report 2008*).

Institution-wide assessments include the Self-study done by MSCHE as part of our accreditation process in 2015 (*UMCEs MSCHE Self-Study 2015*), a 2018 Accreditation Progress Report (*UMCEs Accreditation Progress Report March 2018*), and this current self-study. This review process ensures that UMCEs is complying with the MSCHE's policies and working continually to improve. The current self-study was granted an extension due to extenuating circumstances caused by COVID-19.

UMCEs complies with MSCHE's requirements of affiliation. Many of these requirements have been addressed above. Additionally, UMCEs is licensed in the state of Maryland to operate as a postsecondary educational institution, has current students in the MEES program, has representatives that communicate with the MSCHE in English, and complies with the requirements of all applicable government laws as well as the MSCHE's policies. UMCEs has adequate funding to support educational programs and a record of responsible fiscal management (see Chapter 6). UMCEs is committed to being transparent to the MSCHE as well as the general public.

8. What mechanisms are in place to periodically assess UMCES's ethics and integrity standards?

UMCES has many policies and guidelines related to ethics and standards, as documented in the responses to questions (1) to (7) of the Ethics and Integrity Working Group as part of this self-study. The system in place at UMCES allows for some flexibility in revising and updating these policies, standards, guidelines, and training via several pathways for initiating a review and there is a well-structured process for implementing any needed changes. Review and assessment can be initiated: (1) through Shared Governance groups, (2) via discussion at the periodic meetings of the Executive Council, (3) by changes to USM or UMCP policies that have been adopted by UMCES or form the basis of an UMCES policy, or (4) by faculty, staff, or students through their Unit Director, who may bring suggested changes to the Executive Council. Policy changes are considered by the Executive Council and changes are then voted on. If a majority are in favor, the policy change is recommended to the President for the President's final approval.

However, there has not been a formal, systematic process for periodic review of all policies and guidelines related to ethics and integrity at UMCES beyond this periodic MSCHE self-study. Such a review could also be triggered by a systematic review at the USM level because it would trickle down to many of UMCES's policies. However, there is also not a clearly stated periodic policies review at the USM level. The system presently used at UMCES is effective on a case-by-case basis because there are multiple ways for changes to be initiated and there is a process for considering and implementing any needed changes. The present review and assessment of policies at UMCES can be characterized as well-functioning, but mostly passive and reactive. Policies and standards are reviewed and modified if needed on a case-by-case basis, mostly in response to specific situations that highlight problems with a policy or a guideline or the need for additional or updated training.

Recommendations

We recommend a regular five-year review of all UMCES policies, guidelines, and trainings, along with maintenance of consistent, detailed records of changes between five-year reviews and their degree of success. The review committee should include representation from all UMCES units and shared governance bodies. The committee should: (1) evaluate accumulated interim documentation, (2) review all policies, (3) assess consistency in the implementation of policies across units, and (4) offer suggestions for any modifications.

COVID-19 Impacts

UMCES responded to the impact of COVID on graduate students in several ways. UMCES was not eligible for direct CARES funding because it is not a Title IV

institution. However, the University System of Maryland Foundation made funds available to each USM campus including UMCES to help support emergency COVID-related student needs. Starting in May 2020, several announcements of availability were made to UMCES graduate students. Examples of possible impacts were given, including support for travel necessitated by the COVID crisis, technology/connectivity needs related to virtual communication, or short-term gap funding for students whose Graduate Assistantship funding was threatened by COVID-related interruptions. Six requests were received between June 2020 and February 2021. Two requests for computer or internet support were granted. UMCES was able to grant two of four stipend support requests with available funds. In addition, international UMCES students who were unable to travel were able to take advantage of UMCP graduate tuition scholarships. The VPE Office and GSC were also in frequent communication with each other and with the student body.

The potential impact of COVID on faculty who are coming up for tenure and promotion was also considered. Faculty were notified by President Goodwin in May 2020 of the ability to request a one-year extension for promotion and tenure, which required submitting a request to their Unit Director and for the UMCES President to report a list of faculty granted extensions to the USM Vice Chancellor for Academic Affairs.

The faculty review process for 2020 was altered to accommodate COVID impacts on faculty. Faculty were encouraged (but not required) to submit an appendix to their annual review materials on the direct and indirect impacts that the COVID pandemic has had on them. Faculty supervisors did NOT give a performance ranking in 2020. Unit Directors were still able to recognize any extraordinary performance of individuals in their narrative to the President.

Connections

Since ethics and integrity should be instilled through every part of UMCES – as a part of graduate students' education, university governance, and institutional planning – this Working Group has connections to all other parts of this self-study. Two connections are particularly strong, however. All of UMCES's efforts to promote ethics and integrity support UMCES's mission (*UMCES Mission Statement Final, 2018*), as examined by WG1. By setting high standards for our faculty, staff, and students, UMCES can fulfill the goal of being a "trusted scientific advisor to state and national leaders." By maintaining the integrity of our work, UMCES can "provide unbiased research to inform public policy" and by teaching ethics to students, UMCES ensures that graduates will be "the next generation of environmental leaders." The findings of this Working Group also relate closely to those of WG7. Both groups identified a need for periodic assessment of policies and procedures at UMCES.

Conclusions and Recommendations

This Working Group addressed Standard II – Ethics and Integrity – and found that UMCES has adequate policies in place for all of the MSCHE's criteria except criteria 9 regarding periodic assessment. This Working Group found a strong culture of ethics and integrity at UMCES with policies and procedures in place to address a range of concerns, including protection of intellectual property, fair hiring and promotion practices, management of conflicts of interest, and diversity and inclusion. The commitment of UMCES's leadership to promoting integrity sets the tone for the entire institution. The established policies of UMCES, UMCP, and the USM regarding graduate students, and UMBC for policies regarding intellectual property and tech transfer, provide a clear framework that is both transparent and robust.

The Working Group's recommendations focus on the enforcement and refinement of existing UMCES practices.

1. There is a clear need for an ombudsperson or program who can discuss informal grievances and assist in the resolution of conflicts. This should be implemented in the next two years.
2. While there are systems in place to help UMCES promote diversity, equity, and inclusion, more can be done. The newly established DEIC should continue to plan for and implement improvements in DEIJ at UMCES. The Executive Council and President's Office should continue to support their efforts.
3. There should also be a formal system for regular review of current policies. As outlined in the results section, there should be a group of faculty, staff, students, and administrators assembled every five years to review policies and make recommendations. This will help UMCES identify areas for improvement and adapt to changing situations, building on an already strong foundation.

Chapter 3

Design and Delivery of the Student Learning Experience

Purpose

Effective design and delivery of the student learning experience is the primary responsibility of an accredited institution. UMCES remains dedicated to continuing to improve the delivery of UMCES's graduate courses and the effectiveness of graduate mentoring even while recognizing the significant progress made since UMCES was accredited in 2016.

Working Group 3 addressed MSCHE Standard III, Design and Delivery of the Student Learning Experience, which states that "An institution provides students with learning experiences that are characterized by rigor and coherence at all program, certificate, and degree levels, regardless of instructional modality. All learning experiences, regardless of modality, program pace/schedule, level, and setting are consistent with higher education expectations."

Working Group 3 undertook a critical evaluation of UMCES's design and delivery of its educational programs – both formal educational programs, and critical graduate student mentoring. Working Group 3 addressed nine specific questions that cover all pertinent elements of the design and delivery of UMCES graduate programs. These questions also address the requirements for affiliation established by MSCHE which indicate that an institution must demonstrate that "the institution's student learning programs and opportunities are characterized by rigor, coherence, and appropriate assessment of student achievement throughout the educational offerings, regardless of certificate or degree level or delivery and instructional modality" (MSCHE Requirement of Affiliation No. 9).

The questions considered were as follows:

1. Does UMCES exercise appropriate oversight of its education programs, courses and curricula, including regular assessment?
2. How are UMCES courses designed and revised to ensure scientific rigor, professional applicability, and curriculum coherence?
3. Are UMCES programs, curricula and courses clearly described in its websites and other publications?
4. Are UMCES courses scheduled and delivered to provide regular, predictable access for students?
5. Are UMCES students provided with opportunities for extra-curricular learning and professional development?
6. Are student progress and performance expectations clear, consistent and aligned with program levels?
7. Are UMCES faculty qualified to design and deliver the curriculum and to guide student research?
8. What resources exist for UMCES faculty to improve student learning and education experiences?
9. Are UMCES faculty teaching and advising responsibilities equitably distributed, regularly evaluated, and appropriately recognized?

These questions cover the full scope of UMCES policies and procedures related to the design and delivery of UMCES's educational programs. They offer an opportunity to demonstrate UMCES's commitment to educational excellence, to showcase advances that have occurred in the last five years, and to identify challenges that remain.

Scope

Working Group 3 reviewed UMCES's policies related to the governance of UMCES's educational programs and the standard operating procedures that make those policies operational. The policies are contained within the Consolidated USM and UMCES Policies and Procedures (*UMCES Policies and Procedures*). These policies are available to all UMCES faculty, students, and staff. The following policies are of particular relevance to this chapter:

II-1.00 UMCES Policy on Appointment, Promotion and Tenure of Faculty.

This policy identifies expectations for faculty performance upon appointment and for promotion and tenure across all ranks. In particular, this policy identifies performance criteria involving four pillars of scholarship on which UMCES faculty are assessed: Discovery, Application, Integration and Education. UMCES's expectation for tenure track faculty to be involved in graduate education through formal coursework and research mentoring derives from this policy.

II-1.20 UMCES Policy and Procedures on Annual Faculty Evaluations.

This policy identifies the review and evaluation procedures for UMCES Faculty. It specifies the annual review and 5-yearly comprehensive post tenure review process undertaken by all faculty.

III-7.10 UMCES Policy and Procedures on Graduate Education.

This policy identifies the structures, roles and responsibilities within which UMCES's education programs operate.

Working Group 3 examined standard operating practices and guidance documents developed by the UMCES Vice President for Education's Office (UMCES VPE) and committees that report to the UMCES VPE including the UMCES Graduate Faculty Council (UMCES GFC) and the UMCES Programs, Curricula and Courses committee (UMCES PCC).

Taken together, the formal policies, the standard operating practices and the guidance documents provide the enabling authorities, responsibilities, and administrative structure through which UMCES operates its educational programs.

Working Group 3 also assembled historical data (2010-2020) on the involvement of faculty in UMCES educational programs. This included data on the number graduate students enrolled, the number of courses offered, levels of student enrollment and the number of graduate students advised per faculty. The Working Group assembled data on the graduate courses taught by UMCES faculty over the last decade. These data included enrollment information where available. For jointly taught courses, no effort was made to assign differential contributions. These data were assembled from records kept by the UMCES VP-Education office.

Early on in the self-study process, gaps in the data available to Working Group 3 on extra-curricular training opportunities became apparent. Accordingly, the workgroup designed and delivered a survey to current UMCES graduate students to assess their understanding of the extra-curricular opportunities for learning and the degree to which they access these opportunities. Thirty-nine responses were received to the survey (41% of the UMCES graduate student body); although this response rate was lower than desired, survey coverage was broadly representative of the UMCES student body across all laboratories.

Analysis and Problem-Solving Methods

Working Group 3 met regularly during the development of the report. A single committee member was charged with primary responsibility to produce a first draft of a response to each question. Working Group 3 used subjective mapping of practices onto policies to determine the extent and equity with which policies are implemented, quantitative analysis of historical data on graduate education and the results from the student extra-curricular opportunities survey to critically evaluate whether UMCES succeeds in its aspiration to deliver a world class, bespoke graduate experience.

Results

1. Does UMCES exercise appropriate oversight of its education programs, courses and curricula, including regular assessment?

UMCES uses a tiered, organizational structure to provide oversight of its educational mission (*UMCES Accreditation Progress Report March 2018, p. 7-9*). The organization of the UMCES graduate education structure is designed to facilitate a shared governance approach. The roles of the different responsible parties are described below (see

also Figures I.2 and I.3).

The UMCES President. The UMCES President oversees UMCES's research and educational enterprises. The UMCES President provides institutional leadership and vision. The UMCES President exercises ultimate authority over all educational activities within UMCES, including but not limited to policies, budgets, strategic initiatives, and faculty hires.

The UMCES Vice President for Education (VPE). The UMCES VPE serves as the principal educational officer for UMCES, as established in UMCES policy III-7.10. II.A (*UMCES Policy and Procedures III-7.10 Graduate Education, II.A.*). At an operational level, the VPE is responsible for implementing the UMCES Policy for Graduate Education by establishing, overseeing and delegating policy implementation to a number Councils and Committees. The VPE serves as:

- A member of the UMCES Executive Council and is thereby involved in high level institutional decision making
- Chair of the UMCES Graduate Faculty Council which is the primary body responsible for implementation of the UMCES Policy for Graduate Education
- An ex officio member of the UMCES Program, Curricula and Course committee which plays a critical role in implementing and revising UMCES Graduate programs (see below)
- An ex officio member of the MEES Program Committee, the principal policy making body for the University System of Maryland MEES Program
- A member of the University System of Maryland (USM) Provost Council

The UMCES Director of Graduate Certificate Programs and Extended Learning (currently filled by an interim appointment).

This position reports directly to the UMCES VPE, and is responsible for exploring, developing, and coordinating delivery of UMCES professional and graduate certificate programs.

The UMCES Laboratory Directors.

The Laboratory Directors provide academic and research leadership at each of the four UMCES laboratories. Reporting to the UMCES President, the Laboratory Directors provide direct oversight of faculty and students at each of their respective laboratories. Together with the UMCES Vice-Presidents, the Laboratory Directors serve on the UMCES Executive Council.

UMCES Faculty.

Each faculty member is appointed to either tenure-track or research-track positions at one the UMCES laboratories. With the exception of two faculty members within the UMCES Environmental Statistics Collaborative, UMCES faculty hold appointments based on research contributions and potential. Tenure track appointments carry an expectation to teach and advise students. Teaching expectations are generally one course every other year, a level much lower than typical at undergraduate institutions. Although not required under their appointment, many research track faculty are also active in graduate education (Table 3.1). UMCES Faculty may apply for membership on the UMCES Graduate Faculty (*UMCES Policy and Procedures III-7.10 Graduate Education*), which is a necessary condition for teaching (full and associate membership) and graduate advising (full membership). Through an MOU with UMCP (*MOUs between UMCP and UMCES, page 4 of pdf*), faculty who are members of the UMCES Graduate Faculty are appointed as graduate faculty at UMCP.

Appointment	Average courses/year	Average students/faculty
Research track	0.62 ^a	1.68 ^b
Tenure track	0.39 ^c	1.78 ^d

Table 3.1– Involvement of research track and tenure track faculty in UMCES educational programs. The average values are calculated only on those faculty that teach or who advise, not on the total faculty size. The relevant numbers are (a=12 of 14 research track faculty are involved in graduate teaching, b=8 of 14 research track faculty advise students, c=49 of 53 tenure track faculty are involved in graduate teaching, d=52 of 53 tenure track faculty are involved in graduate advising).

UMCES Graduate Students.

UMCES's 94 students all are enrolled in research-based graduate programs. More than 95% of all UMCES students are jointly matriculated with UMCP in the USM MEES Graduate Program.

UMCES Graduate Faculty Council (UMCES GFC).

The UMCES GFC, defined in UMCES policy III-7.10.II.B, acts on the institution's behalf to develop and facilitate UMCES graduate education policies (*UMCES Policy and Procedures III-7.10 Graduate Education*). The UMCES GFC consists of two representatives from each of the four UMCES Laboratories. One GFC member from each Laboratory is elected from the laboratory faculty at large; the other member is the chair of the Laboratory's GEC. This membership structure directly links the UMCES GFC to the Office of the VPE and to the Laboratory Units. The integration of the UMCES VPE and the GEC Chairs on the GFC ensures that faculty representatives have a common forum to provide feedback on, and assessment of, the

UMCES graduate experience. Graduate students are also represented on the GFC by the currently elected Chair and Vice Chair of the elected Graduate Student Council. Regular meetings of the GFC (once per academic semester, minimum) and the potential for much more frequent subcommittee meetings ensures that issues pertinent to graduate education are addressed efficiently and effectively.

Laboratory Graduate Education Committees.

Under UMCES Policy III-7.10.II.C, each laboratory supports a Graduate Education Committee (*UMCES Policy and Procedures III-7.10 Graduate Education*). Formed out of the faculty and students at each laboratory, the GECs represent the expression of shared governance at each laboratory. The chair of each GEC is a member of the UMCES Graduate Faculty Council.

UMCES Programs, Curricula and Courses Committee (UMCES PCC).

The UMCES PCC was established as a direct result of a recommendation in UMCES's 2015 Self-Study submitted to MSCHE in support of accreditation. The PCC is not defined in UMCES Policies, but is constituted under the authority of the UMCES President. Established in 2017, the UMCES PCC committee is drawn largely from the membership of the UMCES GFC and consists of a chair, faculty from each UMCES laboratory and each MEES foundation area, a student representative, administrative support and additional ex officio faculty members, including the UMCES VPE. Term-limits for membership are 3 years for faculty and 2 or less years for the student representative. The membership details, committee charge and function are detailed in the supporting document (*UMCES PCC Charge and Composition*).

University System of Maryland Graduate Program in Marine, Estuarine and Environmental Science (MEES - mees.umd.edu).

MEES is the principal, but not only, graduate program in which UMCES students are matriculated. Five partner institutions within the USM collaborate in the MEES program, making it the most successful inter-institutional program within USM: UMCES, the University of Maryland College Park, the University of Maryland Baltimore, the University of Maryland Baltimore County and the University of Maryland Eastern Shore. The MEES program is headquartered at UMCP and overseen by a Director, who is currently a UMCP faculty member, reporting jointly to the UMCES President and the UMCP Dean of Computer, Mathematics and Natural Science. UMCES faculty and students dominate the MEES program. UMCES faculty have taught an annual average of 95% of all MEES courses over the last decade. UMCES students dominate enrollment in MEES courses to a similar extent.

The UMCES/MEES Learning Outcomes Assessment (LOA) Committee. The LOA Committee is the most recent

addition to the educational governance structure within UMCES. An UMCES LOA Committee was established as an ad hoc committee in 2019, and quickly expanded to encompass members from all MEES campuses. It is charged with developing programmatic learning outcome assessment plans for MS and PhD students, which includes drafting rubrics and metrics to assess academic and research learning outcomes. The efforts of the UMCES/MEES LOA Committee are described in detail in Chapter 5.

Recommendations

There are no recommendations resulting from this question.

2. How are UMCES courses designed and revised to ensure scientific rigor, professional applicability, and curriculum coherence?

UMCES principal educational program is the MEES program that offers a curriculum that promotes interdisciplinary learning within a disciplinary foundation (*Fig. 3.1 and A Vision for MEES, 2015*). The curriculum was under revision at the time of UMCES's prior self-study, but has since been formally approved. UMCES faculty spearheaded the development of the revised curriculum and teach more than 95% of the course credits. However, as the MEES program is based at UMCP, the approval of the curriculum followed UMCP procedures and involved approval by the UMCP College of Mathematics, Computer and Natural Science's PCC committee and subsequently by the UMCP Senate PCC Committee on November 6, 2015. Formal approval of the curriculum for the entire MEES program occurred at a MEES Administrative Council meeting, the inter-institutional oversight committee, in that same month.

The curriculum structure provides training in one of four broader foundations: environment and society; earth and ocean systems; ecological systems; and environmental molecular science and technology (Fig. 3.1). Foundation courses are taught every fall semester at the introductory 600 graduate level. Subsequently, elective courses (600 & 700 level) provide rigor and advanced training in specific areas. Unique Issue Study Group (ISG) courses (600 & 700 level) provide project-based experiences that lead to peer-reviewed articles, scientific posters, and white papers on topical areas identified by faculty and students. ISG courses are offered every semester, although their focus is topical and constantly changing. The need for skills training is recognized by provision of introductory (600-level) and advanced (700-level) professional development courses that focus on quantitative methods, scientific communication, research ethics, and other professional skills.

The implementation of the new curriculum required development of new courses and restructuring of some

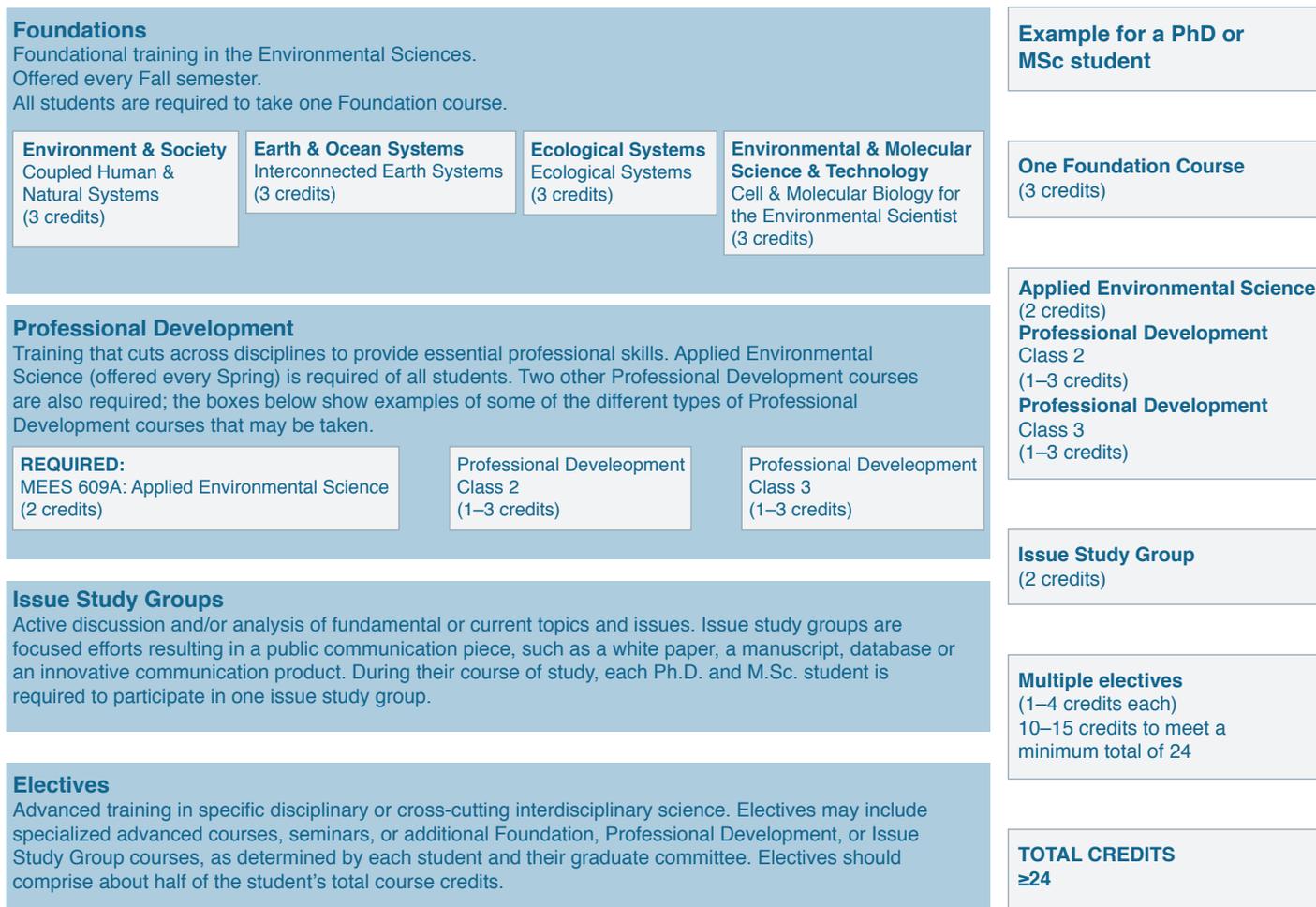


Figure 3.1– The MEES Curriculum showing the four categories of courses offered within the program.

existing courses. These developments initially occurred under the oversight of the UMCES VPE and MEES Program Offices, and subsequently under the oversight of the UMCES PCC, which approves development, design, delivery and revision of all UMCES courses. This committee's chief responsibility is to ensure courses have content with rigor appropriate to the level of the course and are aligned with the curriculum. To achieve these objectives and provide coherence to the curriculum, the UMCES PCC organizes and streamlines course offerings to avoid overlap, redundancies, or gaps in student learning and schedules courses to ensure an appropriate 2 year rotation of courses is offered (*MEES Courses Two Year Rotation*) so that students may graduate in a timely fashion.

Since 2017, the UMCES PCC has improved alignment of courses and driven innovation. The UMCES PCC has developed a specific guidance document to assist faculty in course design for the MEES program. This guidance document (*UMCES Course Creation Guidelines*) provides UMCES faculty guidance in the following areas;

1. Definitions and descriptions of course categories; foundation courses, Professional development (PD) courses, Issue study groups (ISGs) and electives.
2. Course credits and numbering (i.e. 600 or 700-level and consistency of numbering to fit

within the MEES curricula (also see specific guidelines on this; UMCES Guidelines for course numbering_09262019). Definitions and descriptions of course syllabi; what to include and how to address course and program learning outcomes, including a course syllabus template.

3. Course lifecycle, including how to propose a new course.

UMCES faculty who propose a new course must complete an UMCES New Course Proposal form (*UMCES New Course Proposal Form*). Proposals must address program learning outcomes (PLOs) and identify any overlap with existing courses (using the syllabi repository site). The information provided in the new course proposal form is used by the UMCES PCC in determining whether to approve or reject a new course, request modifications (i.e. number of credits or when it is being offered) and/or suggest that the course be offered as a different format. The UMCES PCC committee evaluates and maps the course learning outcomes (identified in the course description) with the course assessments proposed. The tentative course schedule and examination/assessment details are evaluated to ensure that the course is appropriate for the number of credits and the course level.

Each time a course is offered, UMCES faculty must complete an Intent to teach form (*UMCES Intent to*

Teach Form) and update their syllabus using the new standardized syllabus template (*UMCES Syllabus Template, Nov 2019*) as needed. The first page of the syllabus template provides an overview of the course, defines how the curriculum fulfills PLOs, and provides specific course learning outcomes. Details on course assessment and grading, a tentative detailed weekly course schedule, course communication and course specific policies and expectations are provided on subsequent pages.

UMCES faculty have access to the USM Kirwin Center for Academic Innovation (*University System of Maryland Kirwin Center for Academic Innovation*), which provides pedagogical and course design support. In particular, the USM OnTrack program works to provide instructional design and technology support to advance distance learning. UMCES faculty used this support extensively in 2020 in response to the COVID-19 pandemic.

The majority of all UMCES courses are taught using a Moodle open-source learning management system (*Moodle*). Faculty have access to a Faculty Learning Hub on Moodle which includes “how to” videos, pedagogical principles, and other support. A similar Student Quick Start Guide is available.

Recommendations

UMCES faculty should be incentivized to take advantage of opportunities to enhance the delivery and pedagogy of UMCES courses to maximize the benefits of UMCES’s distributed, synchronous model of course delivery.

3. Are UMCES programs, curricula and courses clearly described in its websites and other publications?

UMCES actively maintains “Education” pages on its main website (*UMCES General Education Overview*). These pages focus principally on UMCES’ graduate programs, serving both to inform prospective students about UMCES’ programs, profiling student and alumni stories, and providing information to current students on education policies and practices. UMCES also maintains pages that introduce programs for K-12 students, undergraduates and continuing education for teachers.

Information for prospective students on UMCES graduate programs is a prominent feature of the *UMCES Graduate Education* page. Clicking on the name of each program provides dynamic content that motivates and describes study. Further clicks link to the main MEES program site, hosted at UMCP, which provides the curriculum for the foundation courses and a listing of faculty across all five partner institutions with research interests related to the foundation areas. Each faculty entry provides email contact information and a link to the faculty person’s web site on their own institution’s page. Transitions between the UMCES graduate education pages and the main MEES program webpages are smooth and transparent, reflecting the deep partnership within MEES.

Although descriptions of course offerings are available on the UMCES web site, it is more difficult to find information on the graduate research experience that would help explain the process, or the range of research approaches - from genes to ecosystems, and from test-tubes to numerical models - that prospective students could pursue. This is an important omission.

Information for current students is on the MyUMCES portal of the website. This information includes a link to the 2-year course rotation plan that allows students to plan their programs effectively (*MEES Courses Two Year Rotation*). This spreadsheet is greatly appreciated by current students who use it early in their program in determining their plan of work. The site also includes descriptions of the 52 UMCES courses in a single, searchable pdf file (*MEES Course Catalog*). The catalog provides a summary description of each course, together with information on instructors, scheduling, course credits and category. Individual syllabi for each course are also available (*UMCES Course Syllabi*), organized by curriculum category. Clicking on any single course opens a pdf file that has the course syllabus in a standardized format. At the present time, however, the placement of some of these resources in the hierarchy of the UMCES website can make finding them somewhat difficult.

Creating a single unified description of UMCES educational programs is challenging because of the complex relationships among UMCES’s and its institutional partners. The fact that students must apply to one of the MEES partner institutions for admission necessitates that web sites of at least two institutions must be coordinated. Thus, navigating UMCES’s graduate opportunities will always be a balance between providing the most complete current information and avoiding duplication.

Recommendations

The UMCES Educational web site should be redesigned into a single, but potentially differentiated site, targeting both prospective and current students. This will lead to a simpler structure, making sharing of information easier and a more streamlined design. The current separation of a forward-facing presence for prospective students, and an inward facing area within the MyUMCES section of the UMCES web site for current students limits access to information for both groups, requires duplication of information and is more complicated than necessary. The revised UMCES education web site also should include specific information on the experience of and expectation for graduate research as this is an essential element of all of our current programs. A streamlining of educational material might provide an opportunity for heightened branding as well. For example, the site might enforce opening of a new browser tab when a link directs a user to a site owned by another institution.

4. Are UMCES courses scheduled and delivered to provide regular, predictable access for students?

The UMCES PCC, the UMCES VPE office, the MEES office, and UMCP registrar work together to ensure courses taught by UMCES faculty in the MEES program are offered regularly, listed in a timely manner and that sufficient capacity exists to meet enrollments. The UMCES PCC has set deadlines for UMCES faculty to offer courses: May 1st for the following Spring offerings, and by December 1st for the next year Fall offerings (*UMCES Course Creation Guidelines*). The UMCES VPE (with the MEES PCC) works across the MEES Institutions to ensure coordinated scheduling between UMCES and MEES courses.

UMCES offers courses with a permanent number and some that are designed to be temporary or one-time course offerings. The distinctions between these two types of courses are detailed in the UMCES course guidelines document (*UMCES Course Creation Guidelines*). Permanent courses are intended to be taught on a regular schedule. Permanent numbers are assigned to courses based on a specific numbering scheme (*UMCES Guidelines for course numbering_09262019*) such that the number helps inform students of course content.

There have been a few cases where enrollment in a course has been too low to continue to offer it in that semester, such that the course was cancelled. This is challenging for students as this cancellation occurs after the first two weeks and after the time limit for enrolling in an alternative class. The UMCES PCC has provided additional guidelines for low-enrollment courses, in that, if a course is cancelled twice in a row due to low enrollment, the course will be discussed by the UMCES PCC in consultation with the instructor(s) and may be removed from the regular course rotation, or possibly offered less frequently.

Recommendations

UMCES should continue to refine course scheduling to ensure students can complete their degrees on time while having access to courses relevant to their area of study.

5. Are UMCES students provided with opportunities for extra-curricular learning and professional development?

UMCES is committed to providing formal, course-based skills training to students, particularly early in their careers. UMCES offers much of this training directly within the MEES program. All MEES students are required to take 3 Professional Development courses. The first, Applied Environmental Science, offered every spring, is required

of all students. The course provides students with tools to work effectively in teams, to learn and appreciate the contributions from different disciplines and the experience of preparing written and oral communications. Students are also required to take two additional Professional Development courses which are organized into three main areas: quantitative tools (mathematics, statistics, and programming); science communication; and ethics and values. At least one course from each area is offered every semester. The selection of which elective Professional Development courses a student takes is made by the student in consultation with his/her advisory committee.

In addition to formal course-based skills training, UMCES also encourages and helps support students who seek professional development training outside of the institution. For some students, courses outside of UMCES's research and teaching environment are required for them to undertake their specific research. In other instances, students avail themselves of other opportunities to enrich their curricula.

At the core of UMCES's approach to graduate education is the responsibility taken on by individual faculty and by the UMCES community to train, mentor and support students. As such, UMCES students have many informal opportunities for professional development training, including:

- Regular, often weekly, meetings with their graduate advisor to discuss research, science, careers and emerging issues of concern.
- Weekly seminars that expand and diversify the exposure of students to research. Students are encouraged to interact with speakers both through one-on-one and group meetings.
- Student seminars, during which students gain experience presenting their results and receive feedback based on their presentations. These seminars have been expanded recently to include issues of professional development. Recent topics have included CV building, getting a paper published, understanding career metrics (such as h¹ scores), interviewing training, grant writing and funding opportunities. Topics have generally been developed based on student interests and requests.
- Writing clubs for students and faculty exist at each laboratory – either to find quiet time and space to write or to obtain feedback from colleagues on their work in an informal setting.
- Students are encouraged to take advantage of research opportunities that may expand their skills and experiences, whether or not those experiences are directly related to their thesis or dissertation research. As examples, one student undertook a 6-week research cruise in the Indian Ocean, several students have undertaken extended research experiences in China, one student studied for

several weeks in Wales working with an international expert in ecological modeling, another student had extensive field work at the Hawaiian Institute of Marine Biology, while yet another student studied for a period of time in a French laboratory.

UMCES recognizes the importance of faculty sponsoring students, post-doctoral fellows, and junior faculty colleagues. Early career scientists are encouraged to participate actively in conferences, scientific societies and to take advantage of opportunities to engage in research not directly tied to their specific projects.

- **Conferences.** All students are highly encouraged to attend research conferences and to present their work. Students are encouraged in the early years of their study to attend local conferences or local chapter events of national societies. Based on survey results, UMCES students presented an average 2.6 talks or posters as lead author and were a co-author on an additional 2.1 presentations since they started the program. Attendance at half of these conferences was grant supported, with the other half being provided either by laboratory funding, conference-provided student support funds, or external philanthropic support. Sea Grant Program Development funds are another avenue of support for some students, as for example, its partial support of 9 MEES graduate students to attend the International Marine Biotechnology Conference, 2019, in Shizuoka, Japan.
- **The annual MEES Colloquium** is another, unique opportunity for students to network with faculty and students from other laboratories, to present their work in an informal setting, and to be part of the conversation about the continuing development of the MEES program.
- **Conference Workshops.** Students have taken advantage of many training and professional opportunities and workshops offered in conjunction with their conference attendance. Students are highly encouraged to become members of professional societies and to use all of these resources. Travel funding is often provided by the laboratory units as well from research grants.
- **Mentoring and Teaching.** UMCES students have many opportunities for mentoring undergraduate interns, including those from Maryland Sea Grant, the College of Southern Maryland, Chesapeake College, and Frostburg State University. Through these programs, students learn how to work one-on-one with students who may be paid for their internship or who may be short-term volunteers. Students also may be TAs for some MEES classes, funded through the individual laboratories of UMCES. Teaching opportunities have been available also for students at local community colleges, and local 4-year universities including Frostburg State University, St. Mary's College of

Maryland, Salisbury University, and Washington College.

- **Entrepreneurial training.** A unique program available for UMCES students is training in entrepreneurial activities. The Ratcliffe Environment Entrepreneurs Fellowship (REEF) Program builds business skills, exposes students to business plans and principles, and can provide seed funding for students with viable ideas for company formation.
- **Professional and Leadership experience.** Students also build skills through multiple opportunities to engage in committee activities, which are addressed in other Chapters.

Recommendations

Based on a recent survey of students, there is a desire for more opportunities to develop career skills such as strategies for job searches, CV development, and interviewing. Students have also requested enhanced short-course opportunities to learn new methods.

6. Are student progress and performance expectations clear, consistent, and aligned with program levels?

UMCES offers research-based graduate training that leads to either a Masters (MS) or Doctoral (PhD) degree. The limited range of training UMCES offers simplifies development of expectations that a student must complete in order to receive their degree. These requirements must be completed within a specific time frame.

Student specific progress expectations are clear, consistent, and aligned with program levels. Progress expectations are defined as follows:

- *Master of Science Requirements*
 - Establishment of a graduate advisory committee by the end of the first year, comprising at least three faculty holding graduate faculty status, including and chaired by the student's Graduate Advisor.
 - Required yearly committee meeting/report
 - Required 24-credit hours course work, usually within the first 2 years
 - Required 6-credit hours of research credit
 - Required thesis defense
- *Doctor of Philosophy Requirements*
 - Establishment of a graduate advisory committee by the end of the first year, comprising at least five faculty holding graduate faculty status, including and chaired by the student's Graduate Advisor. Often one member of a PhD advisory committee is external to UMCES.

- Required yearly committee meeting/report
- Required 24-credit hours of coursework, usually within the first 2 years
- Required 12-credit hours of research credit
- Successful passage of Comprehensive Written and Oral Examination, ideally by the end of the second year
- Successful passage of a Dissertation Proposal Defense, ideally by the end of the third year.
- Advancement to Candidacy and Nomination of the Dissertation Defense Committee
- Dissertation Seminar and Defense of the Dissertation Research, including a representative of the UMCP Graduate Dean.

Assessment of progress occurs through completion of coursework, the required annual committee meeting and various examinations and defenses. Traditionally this assessment was more qualitative than quantitative and was summarized only in reports submitted to the MEES office. Recently, the UMCES/MEES Learning Outcomes Assessment Committee has developed structured sets of assessments to be filled out by the committee at each of the milestone events listed above, described in detail in Chapter 5. In addition, a new guidance document is in development for PhD comprehensive examinations that will apply to all MEES students, regardless of academic background or institution (currently in final review).

UMCES is developing an annual statement of mutual expectations to be filled out by students in collaboration with their faculty advisor, based on a similar statement used at UMCP. This process recognizes that performance expectations vary from student to student (and advisor to advisor) and also vary depending on how each student is supported (e.g., research grants, fellowships, or TAs). The annual statement of mutual expectations will be sufficiently flexible so that it can be tailored to each student. Ideally, this exercise will reduce times to graduation and increase the skillsets of graduates.

Recommendations

UMCES should continue working on its annual statement of mutual expectations with the goals of improving communication, defining realistic goals, and assessing annual progress for both advisor and student.

7. Are UMCES faculty qualified to design and deliver the curriculum and to guide student research?

As Maryland’s Graduate University for the environment, UMCES leads, coordinates, and catalyzes environmental research and graduate education within the University System of Maryland. UMCES faculty all hold earned

PhDs in their field of study, awarded from some of the most prestigious global universities. UMCES faculty are lifelong learners who strive to improve their understanding and ability to undertake research, and simultaneously train the next generation of environmental research and leaders. The qualification of UMCES faculty to design and deliver the curriculum and to guide student research is best exemplified by the track record of the UMCES faculty members who have been recognized with a University System of Maryland Board of Regents Award for Excellence, the highest recognition possible within the USM. UMCES faculty have regularly been awarded this award in recognition of their research, teaching and service (Table 3.2).

Year	Category	Recipient
2010–2011	Public Service	Dr. Margaret Palmer, CBL
2011–2012	Research	Dr. Michael Kemp, HPL
2013–2014	Public Service	Dr. Keith Eshleman, AL
2013–2014	Research	Dr. Andrew Elmore, AL
2014–2015	Public Service	Dr. Thomas Miller, CBL
2015–2016	Mentoring	Dr. Russell Hill, IMET
2016–2017	Public Service	Dr. Mario Tamburri, CBL
2017–2018	Public Service	Dr. Jeff Cornwell, HPL

Table 3.2 – UMCES faculty recipients of the USM BOR Excellence Awards

UMCES faculty also hold leadership positions in international and national societies and organizations. Recent examples include the presidencies of the American Geophysical Union, the International Association for Landscape Ecology, the Associations for the Sciences of Limnology and Oceanography, the National Sea Grant Association, the International Marine Biotechnology Association, the International Association for Hydro-Environment Engineering and Research. UMCES faculty also serve on numerous national and international advisory bodies including the Ocean Studies Board of the National Academies of Science, Engineering and Medicine, the California Delta Independent Science Board, and committees for the International Maritime Organization. These leadership positions reflect the standing of UMCES faculty within the broader national and international scientific community.

UMCES faculty have an outstanding reputation for their research, often publishing in high impact journals such as Science, Nature, Proceedings of the National Academies of Science as well journals appropriate to their research fields. This reputation for high quality research rests on a strong record of grantsmanship from federal (e.g, NSF, NIH, NOAA, NASA, USGS), regional (e.g, US Park Service, US EPA Chesapeake Bay Program), and

philanthropic (e.g., Gordon and Betty Moore Foundation, Lenfest Foundation) sources. This funding provides financial support such that most students are appointed as graduate research assistants, paid to support their advisor's research, and undertake independent research for their own degree program.

This strong research foundation ensures that UMCES faculty have state-of-the-art understanding and knowledge of the fields in which they teach and mentor students. Despite this foundation of knowledge, UMCES faculty often lack formal pedagogical training in course design and delivery. Until recently, there was little focus on improving teaching and ensuring consistency and continuity across courses. However, UMCES has made a consistent and ongoing commitment to ensuring faculty have access to educational instruction and course design support. The most recent demonstration of this commitment is the upgrade to the institutions learning management system, Moodle, to include a course delivery template which will ensure students see a common interface across courses, and development of a number of how-to instructional videos that guide faculty in how to set up courses, assigned reading and gradebooks.

Recommendations

UMCES should expand its commitment to providing training to faculty in instructional design and content delivery. This will likely best be achieved through an ongoing partnership with UMCES's educational partners in MEES.

8. What resources exist for UMCES faculty to improve student learning and education experiences?

Much of student learning in graduate school is gained through research experiences. Due to the small size of the UMCES student body, there are ample opportunities for students to receive one-on-one research training and advice from faculty. It is not uncommon for faculty and students to engage in detailed research discussions, including faculty/student interactions that are not formally recognized by program assessment. Indeed, much of the student learning achieved by UMCES students occurs in non-traditional settings (outside the classroom), including guided laboratory and field experiences, regular and impromptu lessons in scientific programming with faculty and postdocs, and strategic lab group meetings led by principal investigators. Laboratory Directors across the center take an active role in evaluating graduate student progression under the advisement of individual faculty and incorporate these evaluations into annual faculty reviews. Formal teaching evaluations are also discussed in these reviews, and therefore the annual review serves as an important opportunity for faculty to reflect on their success in areas of student learning and education.

Formal learning experiences (classroom instruction) also serve an important role at UMCES in facilitating student

learning and education. Courses are ideally suited to elevating all students to a level of common understanding necessary for science communication across fields, and enlightening students to the full breadth of scientific knowledge and activities relevant to their respective fields. There is a deep and authentic tradition at UMCES to value teaching, and perhaps due to the relatively low teaching load, there is a sense that faculty universally enjoy the process of designing and annually improving course instruction. Improving formal education experiences is therefore an important goal of the institution.

Development of the education program at UMCES, and therefore provision of resources to faculty for the improvement of student learning and education experiences, is shared between the UMCES VPE and the Laboratory Directors. Due to the small size of the UMCES faculty, the VPE is well known and has regular interactions with each faculty member. Individual Laboratory Directors guide new faculty through their introductions into graduate teaching and advising. This process generally begins through the development of a mentoring committee for each new faculty member. Mentoring committees consist of tenured faculty, usually at the home laboratory occasionally including faculty at one of the other laboratories. Through discussions with their mentoring committee, new faculty develop their ideas and approaches to traditional and non-traditional education. These interactions are an important time to identify gaps in the new faculty members' experience that should be filled through additional professional development.

Co-teaching of courses is an important mechanism at UMCES for accomplishing faculty learning in the areas of classroom instruction and course administration. Co-teaching allows each faculty member to lecture and lead discussions on their specific areas of expertise, therefore enhancing the overall learning experience. Due to UMCES low student:faculty ratio, there is insufficient demand for regular additions of new courses to the curriculum without the removal of existing courses. However, in an evolving field such as environmental science, there is always the demand for new material to be provided to students. Therefore, foundation courses and electives are in a constant state of development to reflect advancements in the field. Importantly, co-teaching allows new faculty to learn from more experienced faculty. Learning includes the formation of a syllabus, defining learning outcomes, and selection of specific instruments of instruction and assessment. When it works well, senior faculty successfully critique lectures provided by new faculty, offering constructive criticism when necessary. Conversely, senior faculty are often inspired by the enthusiasm of new faculty and benefit from new perspectives on approaches and techniques new to the field.

Formal resources for faculty improvement available to UMCES faculty are provided through collaboration with

UMCP and USM. This is a logical approach due to the small size of the UMCES faculty and the breadth of established offerings across the USM. Efforts by UMCES to make best use of these resources have developed over time. For example, in 2020 UMCES joined a special summer 2020 initiative of the USM to explore a variety of options for enhancing online teaching and learning. The overall program is known as *USM OnTrack*. The USM OnTrack initiative also provides UMCES faculty with opportunities for professional development through a series of webinars addressing online teaching, learning objectives, assessment techniques, and improving accessibility, run by Quality Matters (*Quality Matters*). These webinars represent a valuable opportunity for UMCES faculty to enhance online teaching skills and improve courses, at no cost to UMCES. Finally, through this initiative, UMCES has partnered with iDesign (idesignedu.org) to provide faculty with web-based resources focused on fundamental online instructional design and pedagogy support through an integrated “Online Teaching Hub” in the Moodle Learning Management System.

While USM OnTrack represents a new and timely addition to resources available to UMCES faculty, the UMCP Teaching & Learning Transformation Center (TLTC; *UMCP Teaching & Learning Transformation Center*) consistently offers numerous resources for faculty interested in improving student learning and education experiences. For example, each autumn the TLTC offers a Graduate Teaching Orientation program that covers (a) Practical training for effective teaching, (b) support in developing teaching identity and philosophy, and (c) knowledge of campus resources for teaching, learning, and professional development. The TLTC is accessible to UMCES faculty. In addition to the autumn institute, TLTC provides resources for developing courses (and the quality of faculty instruction).

Recommendations

More UMCES faculty should take advantage of the USM OnTrack program provided by USM, and faculty professional development activities should be reported during annual reviews. This information should be shared with the VPE. As recommended by the 2019 MEES *Virtual Software Committee Report*, opportunities for faculty learning need to include topics that are specifically relevant to running virtual and distant learning classrooms. In addition, at the annual faculty gatherings (UMCES Convocation and the MEES Colloquium), effort should be spent on coordinating teaching methods and learning outcomes across the four foundations.

9. Are UMCES faculty teaching and advising responsibilities equitably distributed, regularly evaluated, and appropriately recognized?

The UMCES faculty is distributed among three categories of appointment: agent, research-track, and tenure-track faculty (Figure 3.2). *UMCES Policy II-1.00 Appointment, Promotion, and Tenure of Faculty* recognizes four categories of UMCES faculty with respect to teaching and advising responsibilities:

- Tenure-track faculty hold appointments that expect both a sustained, extramurally-funded research program that includes advising of MS and PhD students, and teaching a minimum of one course every other year in an area within their discipline. In support of this commitment, UMCES guarantees 75% of the annual salary of these faculty. The balance of the annual salary must be raised by grants and contracts. 78% of UMCES faculty fit within this category.
- Research-track faculty hold appointments that expect a sustained, extramurally-funded research program. Involvement in graduate advising is desired, but not required of these faculty. There is no formal teaching requirement for these faculty, although many do teach. UMCES provides up to 49% of the annual salary of these faculty; the balance must be raised by grants and contracts. This additional demand on funding their salary explains why involvement of research-track faculty in teaching is lower. 16% of UMCES faculty fit within this category.

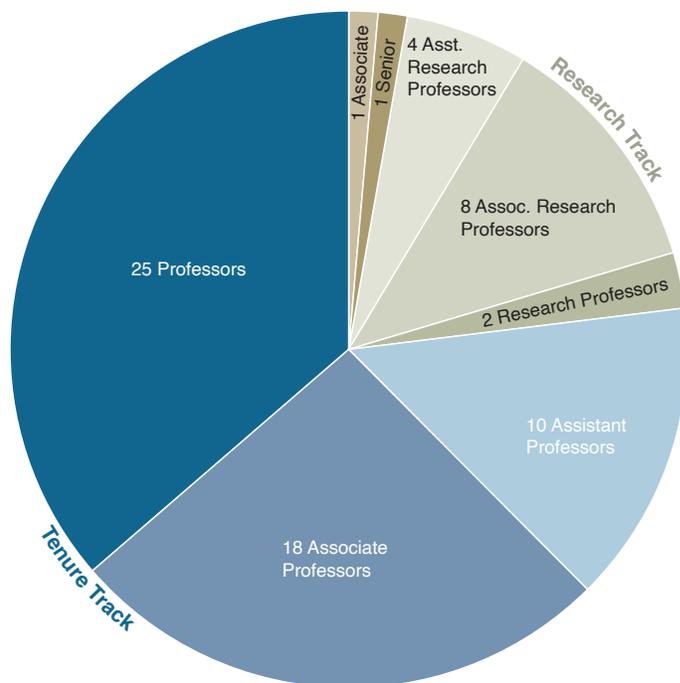


Figure 3.2 – The distribution of appointments within UMCES faculty ranks in January 2021

- Research-track teaching faculty hold appointments that expect a commitment to teaching graduate courses. These faculty are guaranteed 49% of their salary from funds returned directly from the courses they teach. Currently, this model is used only within the Environmental Statistics Collaborative at CBL. Environmental Statistics Collaborative faculty are expected to be involved in graduate advising in a supporting role, serving on graduate advisory committees. The balance of their annual salary is supported by grants and contracts led by Environmental Statistics Collaborative faculty, and by consulting fees derived by grants and contracts led by other faculty members. Two UMCES faculty (3%) in the Environmental Statistical Collaborative fit within this category.
- Tenure-track Agents hold appointments that focus on extension, reflecting UMCES tradition of working in the community. These faculty members often hold joint appointments with UMCP, a land grant institution with a large traditional extension program. Agents are not expected to advise students or teach. Two UMCES faculty (3%) fit within this category.

Since the implementation of the new curriculum in 2015, UMCES faculty have taught 82 different courses, a significant increase over that taught previously (Fig. 3.3). Among these courses are four new Foundation courses (Environment & Society, Interconnected Earth Systems, Ecological Systems and Cellular and Molecular Biology for Environmental Scientists), two new core environmental statistics courses, and 10 topical issue study groups.

Course Number	Course Title	Avg. Enrollment (AY2015/2016–2019/2020)
MEES 609A	Applied Environmental Science (2 credits)	33.9
MEES 698B	Environmental Statistics I (3 credits)	23.6
MEES 608D	Scientific Writing & Communication (2 credits)	17.2
MEES 608B	Responsible Conduct for Research (1 credit)	15
MEES 708X	R Programming (Basic) (1 credit)	13

Table 3.3 – Most highly subscribed MEES courses over the past five years.

Courses have had an average enrollment of 9.25 (\pm 6.51 SD, range 1-37) students/course. Courses may be cancelled if there are fewer than 5 students enrolled. The most highly subscribed courses are shown in Table 3.3.

It is of interest that all of these courses are within the Professional Development category. These courses appeal to students across all four Foundation areas and thus benefit from a broader constituency.

In total, 61 different UMCES faculty members have taught or co-taught graduate courses in the five years (*MEES Courses with faculty and enrollment 2010-2019 20200812*). The new curriculum has also entrained more faculty into UMCES's educational offerings. As expected, the distribution of the number of courses taught by individual faculty is not even (Fig. 3.4). A few faculty are not engaged in formal instruction. About 2/3 of the faculty teach less than the one course every other year (i.e., 0.5 courses/year - Fig 3.4) required of tenure track faculty, whereas other faculty teach considerably more (Fig. 3.4). The median teaching load at UMCES is approximately 0.39 courses per faculty per year. The average teaching load is 0.48 ± 0.43 (mean \pm SD).

UMCES is committed to the regular evaluation of faculty teaching and advising. UMCES policy on Appointment, Promotion and Tenure of faculty (*UMCES Policy II-1.00 Appointment, Promotion, and Tenure of Faculty*) specifically identifies the four “pillars of scholarship” upon which faculty are evaluated: discovery, integration, application and teaching & advisement. These pillars are derived from Boyer’s Scholarship Reconsidered report to the Carnegie Institution (*Scholarship Reconsidered Report_Boyer*). UMCES Appointment, Promotion, and Tenure policy provides operational definitions of each area. Each area must be considered in annual reviews, 5 year reviews and promotion evaluations. The weighting

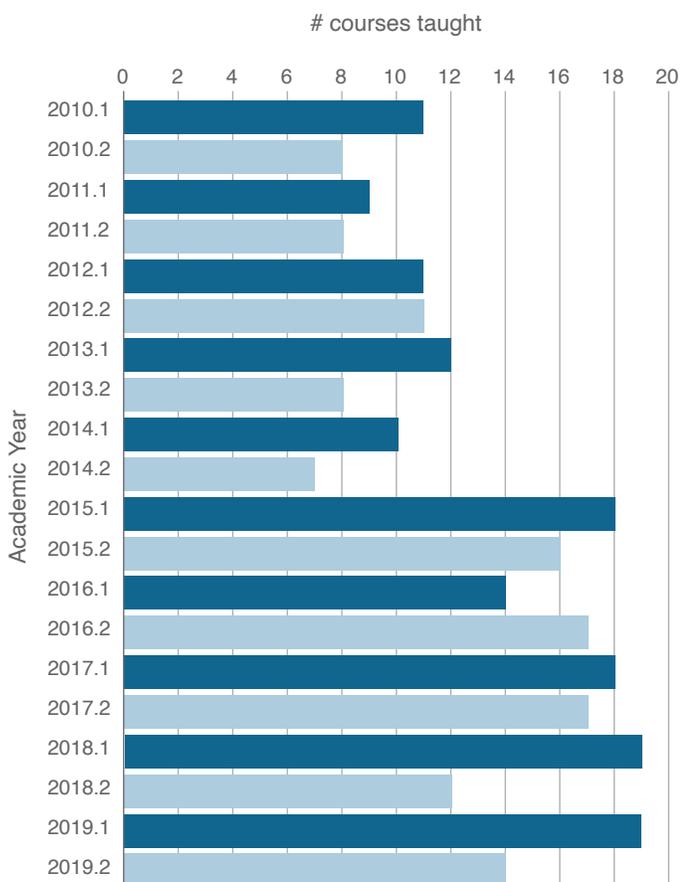


Figure 3.3 – The number of courses taught in each academic year (AY) since AY 2010/2011. Courses taught in the fall semester are shown in dark blue, those taught in the spring semester in light blue. The current MEES curriculum was implemented in AY 2015/2016. The increase in course offerings with the new curriculum is clear in these data.

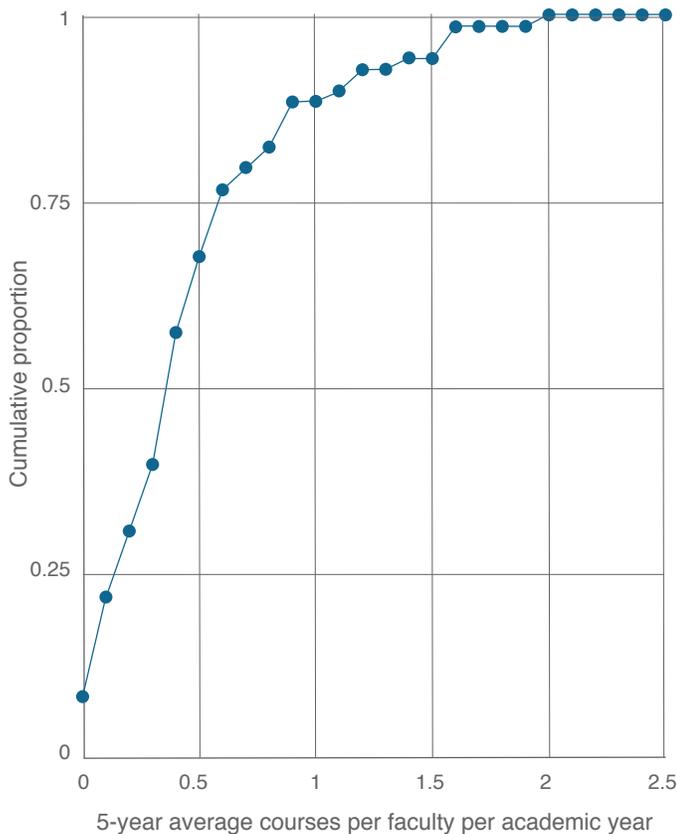


Figure 3.4 – The cumulative distribution of the average teaching load per academic year of UMCES faculty based on the most recent 5-year period (AY2015/2016-2019/2020)

of each area can differ appropriately to each individual faculty member's appointment and career stage, but each must be considered. Laboratory Directors are responsible for conducting annual faculty reviews. In general, this process involves submission of a CV and performance evaluation by the individual faculty member. The Laboratory Director combines this information with teaching evaluations from individual courses the faculty member has taught to provide an evaluation of the faculty member's teaching performance. However, conduct of annual reviews is not standardized across the labs. Moreover, to date, these data are not aggregated at a higher level to evaluate institutional performance that could support a continual improvement process.

Excellence in Teaching and Graduate Advising is recognized annually at UMCES by institutional award conferred by the UMCES graduate students. Students seek internal nominations for excellence in either mentoring and/or teaching. The nomination is then voted on by the UMCES Graduate Students in a confidential ballot, and the award is conferred at the annual UMCES Convocation.

Recommendations

Teaching expectations for individuals and categories of faculty should be made more explicit. UMCES faculty demonstrate a wide range of engagement in UMCES teaching and research training among faculty. Some

of this diversity is expected because of differences in appointment. However, this does not explain fully the range of contributions. There is a desire among faculty for greater clarity on their individual requirements for teaching and mentoring.

In addition, teaching and mentoring evaluations of faculty should be improved and standardized, and the results of such evaluations should be better integrated in annual faculty reviews. The UMCES Faculty Senate is leading a review and revision of the annual and comprehensive review process for faculty, with new guidelines expected to be completed in late 2021. The review is expected to more clearly identify expectations, define evidence required to demonstrate performance and unify faculty reviews across the Center,

Covid-19 Impacts

The COVID-19 pandemic directly impacted both teaching and graduate research training and mentoring programs.

The pandemic effects on UMCES's teaching programs were relatively minor compared to those experienced by many institutions. UMCES has used a synchronous distributed education model that relies heavily on virtual course delivery software for approximately three decades. This model has allowed students from all MEES partner institutions, distributed throughout Maryland to participate in our courses. Traditionally, this model involved enterprise level video conferencing hardware and software, and a content management system (currently Moodle). Students would take classes in person from one of perhaps a dozen potential classrooms equipped with the video conferencing hardware. UMCES had explored ZOOM as a potential alternative video conferencing software in a restricted number of courses because of its perceived flexibility.

With the onset of the COVID-19 pandemic this model of teaching was challenged because even distributed in-person classroom learning was not possible. UMCES quickly transitioned to a fully individually distributed model using ZOOM as an alternative video conferencing platform. UMCES learning management system (Moodle) was already well established and designed for a distributed learning environment.

As a result, the impacts of COVID-19 on UMCES's educational programs were less than might be expected. Teaching stopped on March 13, 2020 as planned, for spring break. Courses were put on hold for an additional week following spring break to allow ZOOM sessions to be scheduled and for faculty to adjust course content and curricula. However, teaching the full suite of courses recommenced on March 30, 2020 and all courses were completed.

Faculty and students adapted to ZOOM rapidly. The one significant change was that a previous policy of strongly recommending students appear on camera during class

that was adopted in ZOOM trial classes was abandoned in favor of a more flexible policy. In the eyes of many, the pandemic-driven switch to ZOOM was a good thing. UMCES is likely to continue with this platform after the pandemic subsides.

In contrast, the impacts of the pandemic on UMCES's graduate research training and mentoring programs were substantial and highly impactful on individual students. Although the teaching program was only disrupted for two weeks, access to UMCES research facilities was highly limited from March 13- June 14, 2020. Spring is a period of high biological activity, and this period is a critical time for many student research projects. This severe restriction on research activities prevented students from initiating some and completing other research projects. The restrictions on travel for research during this period, and continuing until 2021, blocked several students from traveling to field sites, participating in field trips and visiting collaborators who often provide access to key instrumentation.

These impacts are substantial and will likely result in extensions to graduation times for many students. Moreover, the majority of UMCES students are supported by research grants to their advisors. Correctly, UMCES strongly encouraged faculty to maintain salary support for students throughout this period, which spent grant funds at a time when research productivity was hampered. UMCES is faced now with ongoing effects from the pandemic. Some students have had entire field seasons cut; others will need extensions in their planned times to graduate.

COVID had budgetary impacts in addition to the direct impacts on our educational programs and students. UMCES received a 9% cut to its operating budget in FY 2021 based on reduced state revenues. Normally such a significant budget cut would directly impact educational programs. UMCES's educational programs were less impacted than one may expect, because our faculty salaries are not based on teaching FTEs, but rather faculty hold research appointments. As a result UMCES has not experienced a cut to our teaching faculty. Nevertheless, the 9% cut in state operating funds had substantial effects on other areas of UMCES operations. These effects are detailed in Chapter 6.

Connections

Working Group 3 addressed the design and delivery of the student learning experience. There are clear connections between the evidence, findings and recommendations made in this section with those of several other working groups, most notably Working Group 4: Support of the Student Learning Experience and Working Group 5 Educational Effectiveness Assessment. Because UMCES is a mission-driven institution, educational programs are also directly connected to UMCES's Mission and Goals (Working Group 1).

Conclusions and Recommendations

UMCES complies with MSCHE Standard III, Design and Delivery of the Student Learning Experience. Working Group 3 drew the following principal conclusions:

1. UMCES meets its educational mission through clearly defined policies and standard practices that provide, in combination, effective shared governance and oversight of educational programs.
2. UMCES offers research-based Master of Science and Doctor of Philosophy degrees that leverage UMCES's reputation for high quality fundamental and applied environmental research and the institution's strong connections to resource management and policy agencies and foundations.
3. UMCES educational programs are centered around its intellectual leadership of the USM-wide graduate program in Marine, Estuarine and Environmental Sciences which offers a forward looking, interdisciplinary training that combines elements of social science with a strong foundation in natural sciences. Furthermore, UMCES has built into the curriculum extensive professional development opportunities for students that include training in quantitative analysis, scientific communication and responsible conduct of research.
4. Through MEES, UMCES provides a regularly scheduled, dependable curriculum that allows students to complete the clear expectations of their program of study, while undertaking state of the art research.
5. UMCES faculty are highly qualified to develop and undertake the institution's education mission.
6. Support for and opportunities to implement improvements to UMCES educational programs have increased substantially over the past 5 years.

Specific, detailed recommendations are provided in the body of this chapter and are integrated here into a limited number of general recommendations.

1. The Education pages of the UMCES web site need to be redesigned and brought up to date to the benefit of potential students, current students and faculty alike. An effective redesign of the web site also offers an opportunity to more strongly brand the institution.
2. UMCES should commit to and incentivize additional training for faculty in course and instructional

design, and in integration and implementation of learning outcomes assessments to guide course and curricula improvements. These goals will be best achieved through partnerships with other USM institutions and through more consistent integration of educational activities in annual faculty reviews.

3. UMCES should continue to lead the MEES program towards continuing improvement through rigor and innovation, with national leadership for interdisciplinary training in the environmental sciences as its ultimate goal.

Purpose

An accredited institution should have policies and procedures in place to support its students, from the moment a student applies to the institution to the time the student graduates and becomes a valued alumnus. Since its initial accreditation in 2015, UMCES has worked to bolster its support of students in a variety of ways and is committed to supporting a changing and diverse student population in the future. This chapter presents the results of an evaluation of overall support of the student experience. We review UMCES's current policies and procedures relevant to the criteria for Standard IV outlined by the Middle States Commission on Higher Education (MSCHE) and we make recommendations for the future.

MSCHE Standard IV states that “Across all educational experiences, settings, levels, and instructional modalities, the institution recruits and admits students whose interests, abilities, experiences, and goals are congruent with its mission and educational offerings. The institution commits to student retention, persistence, completion, and success through a coherent and effective support system sustained by qualified professionals, which enhances the quality of the learning environment, contributes to the educational experience, and fosters student success.”

When we formulated questions for our work group, we wanted to ensure we posed questions that covered not only the traditional mechanisms for student support, but also questions that covered the unique opportunities and challenges UMCES faces due to the broad geographic distribution of its laboratory units. Additionally, we looked to the future, hoping to capture and analyze whether we are structured up to support both the students we have now as well as populations we wish to serve in the future along with any future challenges our student population may face. Our questions also help answer portions of the MSCHE Requirements of Affiliation 8, including “The institution systematically evaluates its educational and other programs and makes public how well and in what ways it is accomplishing its purposes” and 10, “Institutional planning integrates goals for academic and institutional effectiveness and improvement, student achievement of educational goals, student learning, and the results of academic and institutional assessments.”

We considered seven questions:

1. Does UMCES provide up-to-date, accessible information to prospective and current students about expenses and financial support?
2. How does UMCES meet the professional and personal support needs of its students?
3. How will UMCES adjust to meet the needs of an increasingly diverse student body?
4. Are there established procedures for graduate student orientation and advisement at UMCES?
5. How does UMCES help students deal with the geographically distributed nature of its facilities, form a coherent community, become familiar with resources and faculty, and enhance networking?
6. How does UMCES track, engage, and communicate with its alumni?
7. How and how often does UMCES assess the effectiveness of its student support services?

Scope

The WG members collected data and information from a variety of sources including the student handbook, the education pages on the UMCES website, UMCES policies and procedures, orientation information, and a variety of meeting minutes of shared governance groups, among others. Primary data sources included:

III-7.11 UMCES Policy on Graduate Assistantships: This UMCES policy, effective September 1, 2011, implements BOR III-7.11 Policy in support of graduate students who are appointed to assistantships. This policy is intended to establish baseline standards for the administration of graduate assistantships, with a commitment to fair and continuous improvement in the treatment of graduate assistants in terms of compensation, level of effort and opportunities for professional development.

UMCES Student Handbook: The UMCES Student Handbook provided the WG with a variety of resources directly related to student support, including student groups, pertinent student policies, mental health and wellness information, finance and funding information, and area and support information for international and domestic students.

UMCES Institutional Assessment, 2018: The UMCES Institutional Assessment, conducted in 2018, provided the work group with qualitative feedback on UMCES support of the student experience.

UMCP Resources: Our work group broadly reviewed the UMCP resources available to our students who matriculate through the MEES Program, which represents the bulk of our student body. We incorporated these resources into our narrative. We also noted in our recommendations any student support mechanisms for which we feel UMCES should take more ownership.

Analysis and Problem-Solving Methods

Working Group 4 met seven times from March 2020 through February 2021. Each member of the WG was tasked with answering a question, and each question had a secondary author. All WG members reviewed the chapter once it was complete. Specific policies and services were reviewed from the UMCES Policies and Procedures manual as well as the UMCES education-related websites. Additional information for specific student support programs at the UMCES Laboratories were provided by committee members. Working Group 4 consisted of members from a variety of positions, ensuring they understood the full scope of student support across UMCES and at the specific laboratories. The group had faculty or student representatives from each of the laboratories, including two student representatives who are currently members of the Graduate Student Council, with one holding the position of Chair and the other the position of Secretary. Also included in the group was the Assistant to the VPE, the primary liaison with the students. She ensured that WG4 had broad and comprehensive

access to documents, policies, and procedures related to student support. Finally, a laboratory director was included in the group to ensure high-level input into the specifics of laboratory-student relationships and financial support. Data and resources available from UMCP were obtained from the MEES Office and UMCP Graduate School program.

Results

We present findings from our evaluation of each of our seven questions. For each question, we offer a declarative statement that summarizes our findings. Then, we provide a detailed explanation of data and analyses leading to our findings. For each question, we identify recommendations that stemmed from our analysis.

1. Does UMCES provide up-to-date, accessible information to prospective and current students about expenses and financial support?

UMCES has policies and procedures in place to support student funding, which comes from a variety of sources. UMCES laboratories offer similar recruitment packages to prospective students. The majority of students are offered a stipend (at minimum, one year), ranging from \$25,000 to \$30,000 (*UMCES GRA Stipends*) that is most often derived from external grant and contract funding. Conditions of appointment are outlined on the HR website, in the student handbook, and in the student admissions letters from the UMCES laboratories (*GRA Appointment Template AL*). Stipends are adjusted as students advance in their program at UMCES. Students located at the IMET Unit in downtown Baltimore have slightly higher stipends to reflect the higher cost of living (*UMCES Policy III-7.11 Graduate Assistantships*). Graduate Research Assistants (GRAs) receive tuition remission and can take up to ten credits per semester at no cost to the student. Additionally, GRAs receive State of Maryland Health Insurance coverage, which UMCES reviews with new students at student orientation. When the State of Maryland approves cost of living adjustments, student salaries are generally included.

In addition to grant support from their advisor, UMCES students have access to a variety of fellowships, recruitment and enhancement packages, and travel support throughout their time at UMCES, both from the individual UMCES labs (*UMCES Additional Funding by Laboratory*) and from UMCP (*UMCP Student Fellowships and Awards* and *MEES Menzer Fellowship*). Some awards are available specifically to Ph.D. students to support degree completion, such as the Ann G. Wylie Semester Dissertation Fellowship. Laboratory Graduate Education Committees (GECs) allocate funds to their students, with funding coming from tuition remission return, foundations, or private donations (*UMCES Policy III-7.11 Graduate Assistantships*). These funds are most often used for travel support to conferences, fellowship support, or bridging gaps in student funding from other more

traditional sources. IMET supports 3-4 graduate fellows per year, for up to three years each, using funds from the NOAA-supported Living Marine Resources Cooperative Science Center (*NOAA LMRCSC*). The LMRCSC aims to train the next generation of marine scientists from underrepresented communities. Current LMRCSC graduate fellows are working with mentors at IMET, HPL, and CBL. UMCES students also have access to additional funding and professional development opportunities through TAships at local universities or through MEES courses that have Teaching Assistants (*UMCP TA Offer Letter Fall2020*). In a small number of cases, there are adjunct positions available for which doctoral students may apply, partnering with local Universities and Colleges.

Each of the UMCES laboratories has committed travel support funds for students to attend scientific conferences and workshops as well as specialized courses that focus on particular research topics/techniques. Conference attendance allows UMCES students the opportunity to present their research, explore a variety of careers, and develop valuable networks. Support for students taking focused summer courses (e.g. remote sensing; climate modeling; ocean acidification) provides them with critical skills to advance their research. Support for student travel is managed by both individual advisors and laboratory Graduate Education Committees (*UMCES Additional Funding by Laboratory*). The MEES Program also has travel support funding available from the Debbie Morrin-Nordlund Memorial Travel Award, available exclusively to students in the MEES Program (*MEES Debbie Morrin Award Details*). UMCES students also have access to and take advantage of UMCP travel grants, including the

Goldhaber travel award and the International Conference Student Support Award, both of which help offset the costs of national and international conference attendance, respectively (*UMCP Graduate School Travel Awards*).

UMCES students are routinely selected for the highly prestigious one-year Dean John A. Knauss Fellowship Program run by Sea Grant, matching graduate students with legislative or executive branch offices within the Federal Government (*2020 UMCES Knauss Finalists*). More recently, the National Oceanic and Atmospheric Administration's (NOAA) Margaret A. Davidson Fellowship, a two-year fellowship centered on collaborative research and management of coastal ecosystems, was awarded to two UMCES graduate students (*2021 UMCES Davidson Finalists*).

Starting in Winter 2021, UMCES and the MEES Program have secured State of Maryland Enhancement Funding to support graduate students. These funds will provide student support for highly qualified applicants to the MEES program, in particular for students from underrepresented backgrounds. The original proposal recommended that at least 20% of these funds will be used to support minority students. Remaining enhancement funds in 2021 will be used to offset funding deficiencies for current students due to the COVID-19 pandemic (*MEES Enhancement Funds Email 2021_Tim Canty*).



Amanda Lawrence - UMCES Alum and 2019 Knauss Fellowship Finalist

Amanda Lawrence first came to UMCES-IMET as a summer intern. During her graduate work under Dr. J. Sook Chung, Amanda was funded by the NOAA LMRCSC Fellowship. Amanda also served as the IMET Graduate Student Association President and was a coordinator of the 2019 MEES Colloquium.

In 2020 she was a recipient of the Knauss Fellowship and worked with the U.S. Fish & Wildlife Service in the National Wildlife Refuge System for the Coastal and Marine Program to support coastal watersheds and their surrounding communities through conservation and restoration projects.

“This work impacted me immensely as I was able to understand how federal agencies work (ie., budget) internally, and how they work with both non-federal and federal organizations to carry out restoration and other important types of work. I was also impacted through being able to work closely and collaboratively with others who are just as passionate as I am about the environment, its natural resources and how to best protect, conserve and manage them. This fellowship helped me to confirm that I am moving in the right direction in my career, and further prepare myself - as I gain experience and am exposed to opportunities working to address environmental and natural resource management issues.”

Amanda recently accepted a Program Analyst position with the National Oceanic and Atmospheric Administration (NOAA), Oceanic and Atmospheric Research (OAR).

Recommendations

- UMCES should enhance its website regarding student financial information, including adding available student funding and fellowships, clarifying the need for funding once accepted, clearly stating information about stipend levels and benefits, and outlining the cost of living at the various campuses.
- UMCES should review the Graduate Assistant (GA) appointment letter to ensure comprehensive and uniform financial information is being relayed to all incoming GAs.

2. How does UMCES meet the professional and personal support needs of its students?

UMCES graduate students are provided a variety of both professional and personal support from various sources during their graduate program. Graduate students are admitted after mentorship by an advisor has been guaranteed. Students meet with their advisors frequently to discuss and plan coursework and research (*UMCP GRA Statement of Mutual Expectations*). Advisors work to provide both stipend and research support for their students through grants, fellowships, and teaching assistantships. Advisors also provide guidance and editorial support for students writing their theses and dissertations and assist in the conversion of these documents into manuscripts for publication in scientific journals. Advisors proactively support their students with job placement after their degrees through professional contacts, letters of reference, and interviews.

The UMCES laboratories all have activities that address the professional and personal support needs of their graduate students. Students present research at laboratory-wide student seminars and develop the presentation skills required for future job interviews and presentations at scientific meetings. The laboratories provide financial support for living expenses, travel and registration at scientific meetings, and provide assistance for students to attend workshops and training programs. Laboratory directors meet with graduate students individually and in groups to provide advice as well as to seek input from graduate students on how to improve the educational support for graduate students. Each UMCES laboratory provides training on laboratory safety and provides contact information for laboratory personnel to report sexual harassment (*UMCES Sexual Misconduct Training*).

Students are provided the opportunity to participate in laboratory outreach and development activities such as giving tours, participating in laboratory open houses, interacting with K-12 students during field trips, and attending local outreach events such as science fairs, career days, local festivals, and more. These experiences contribute to improved communication skills with the public. Students can also receive teaching and mentoring

experience by serving as teaching assistants. Students perform outreach activities through participation in the UMCES American Fisheries Society student sub-unit, Society for Women in Marine Science (SWMS), and the American Association of University Women (AAUW).

Students actively participate on laboratory committees (e.g. faculty searches; open house planning; education) and serve on UMCES-wide committees. Eight UMCES graduate students make up an UMCES Graduate Student Council (*UMCES Graduate Student Council*) which has two representatives from each of the four laboratories. GSC representatives are involved with various committees and councils such as the UMCES Administrative Council, UMCES Faculty Senate, USM Student Council, Diversity, Equity and Inclusion Collaborative, and Graduate Faculty Council. The student body at each laboratory meets once per semester. The students are also given the opportunity to make suggestions through their graduate student council representatives who are invited to attend every laboratory faculty meeting.

At the UMCES laboratories there are student organized chapters and groups which support the professional development of our students. The Society for Women in Marine Science and American Association of University Women are two groups that provide support and mentorship for women in marine science. Laboratories also have student organized academic clubs such as Writing Club and R Club.

IMET's Ratcliffe Environmental Entrepreneurs Fellowship (REEF) Program helps UMCES graduate students cultivate the leadership and business skills necessary to bring their research into commercial markets and provides students with an enhanced appreciation of the potential business implications of their research (*UMCES REEF Program*). REEF broadens the range of post-graduate opportunities for students beyond traditional academic teaching and research to include starting a business, advancing careers within established companies, or pursuing environmental policy.

There are a variety of additional ways in which UMCES and MEES support the professional needs of UMCES students. Each year the MEES program conducts a Colloquium which brings together MEES students and faculty from partner campuses throughout the USM. The MEES program, as part of the curriculum, has also developed a number of graduate professional development courses (e.g. Scientific Writing, Science Visualization, Responsible Conduct of Research, Science Communication). The UMD Graduate School has established policies to allow extensions of degree time limits for both maternity and health leave (*UMCP Registration Policies*, see section on Leave of Absence). UMCES is beginning to improve its alumni tracking, which can provide a valuable resource for present students for career counseling and networking opportunities.

Because most UMCES students enroll in the MEES program through the University of Maryland College

Park (UMCP), students can access additional UMCP resources both virtually and in-person. These services include the: UMCP career center (*UMCP Career Center*), UMCP mental health counseling center for students (*UMCP Counseling Center*), UMD health center (*UMCP Health Center*), the UMCP Graduate Student Ombuds Person (*UMCP Graduate Student Ombuds Office*), the Bias Incident Support Services (BISS) office (*UMCP Bias Incident Support Services (BISS) Office*), and International Student and Scholar Services (*UMCP International Students Scholar Service*). UMCES graduate students can also utilize the MEES office at UMCP as well as a number of student social services and activities. Extensive online scientific literature database tools, search engines and digital and physical book holdings are available to UMCES graduate students through UMCP. Students enrolled in other graduate programs have access to similar resources through their respective home campuses.

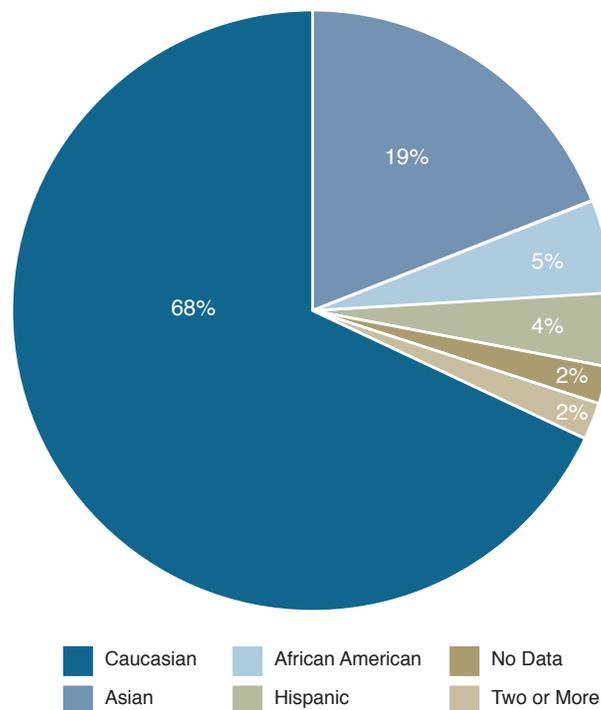
However, since most UMCES students live and work at UMCES laboratories far from the UMCP campus in College Park, MD, access to some of these services can be challenging. Student services received one of the lower grades in UMCES 2018 first IA (*UMCES Institutional Assessment, 2018* and see Chapter 6), partly because of this separation between workplace and regular student services, and partly because of biases in the initial IA survey about student services. An UMCES Ombuds program has been identified as a service that would be more effective locally than at UMCP, utilizing Ombudspersons more familiar with UMCES structure and working environment. As a result, UMCES is in the process of developing its own Ombuds program; this resource will be available to all members of the UMCES community, including students.

Recognizing that graduate school can be a stressful experience, particularly for students from underrepresented backgrounds and international students, UMCES formed a Mental Healthcare Committee and developed a customized list of local mental health resources available to students, staff, and faculty at each of the lab units (*UMCES Mental Healthcare Report and Resources, 2021*). Where applicable, the Mental Healthcare Committee listed mental health providers that have expertise working with specific identities (BIPOC, LGBTQ+, etc.). This document is updated no less frequently than every two years to ensure information remains current.

Recommendation

- Although UMCES students have access to available ombudspersons through the campuses in which they matriculate, UMCES should continue its work toward the formation of an ombuds office or group within UMCES to better serve the needs of the student population.

2014–2015 Student Race Data



2020–2021 Student Race Data

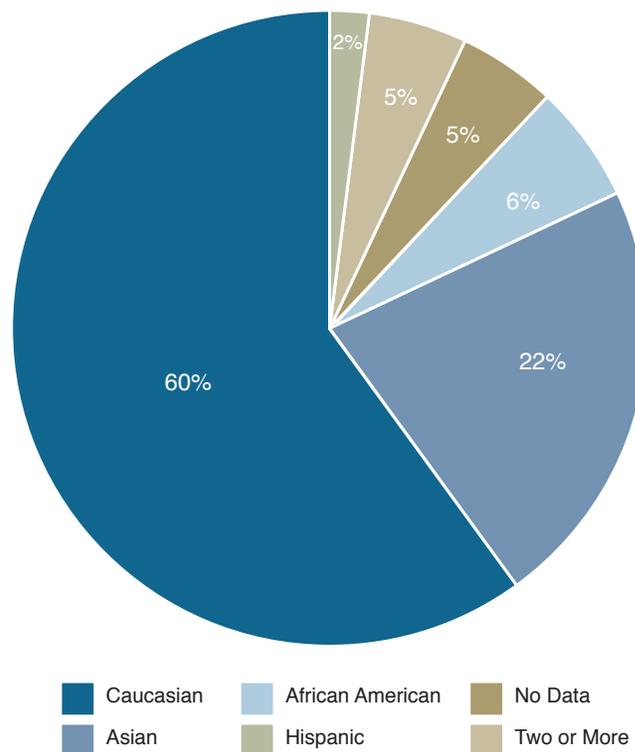


Figure 4.1 – Comparison of self-reported race of UMCES students, Fall 2014–Spring 2015 and Fall 2020–Spring 2021

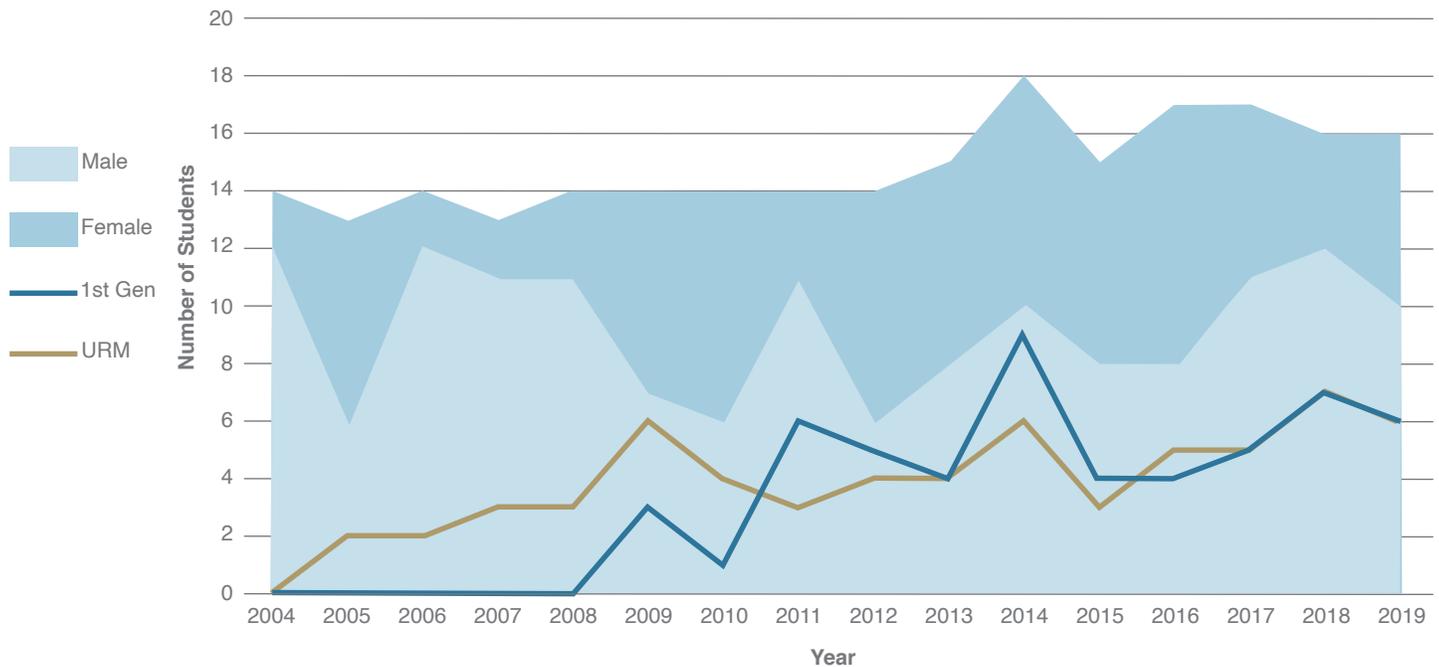


Figure 4.2 – Distribution of Maryland Sea Grant REUs by gender, underrepresented groups and first generation status for all program years.

3. How will UMCES adjust to meet the needs of an increasingly diverse student body?

Like many institutions of higher education, UMCES recognizes that it must actively prioritize equity and inclusion in order to support the needs of an increasingly diverse graduate student community. Several of UMCES's constituent laboratory units have made substantial progress recruiting students from underrepresented racial groups, but there is room for improvement across the institution with regards to both attracting and supporting students from diverse backgrounds.

A key focus of the 2019 UMCES Strategic Initiatives is to “develop a more diverse and inclusive workplace so that our faculty, students, and staff better reflect society.” In addition to recruitment of graduate students and interns from underrepresented backgrounds in the STEM fields, UMCES seeks to actively foster a culture of inclusivity to support the educational, professional, and personal development of its students during their time at UMCES and beyond (*UMCES Strategic Initiatives, 2019*).

While the racial makeup of UMCES students continues to be primarily white (Figure 4.1), several lab units have made progress recruiting and retaining students of color. UMCES does not solicit or retain data on LGBTQ+ identity, disability, religion, socioeconomic background, and other forms of diversity.

Current Initiatives include formation of the UMCES Diversity, Equity, and Inclusion Collaborative (DEIC). The DEIC reflects UMCES's commitment to the Strategic Initiative goal of recruiting and retaining students, faculty, and staff from diverse backgrounds and cultivating an institutional environment that values and supports all

members of the community (*UMCES Strategic Initiatives, 2019*). The DEIC, comprising staff, faculty, and student representatives from each of the lab units and Center Administration, is charged with helping to establish a community of practice committed to equity, respect, and the personal and scientific success of its members, including those from groups that have typically been underrepresented in the geosciences (*DEIC Charge from President*). The DEIC includes two student representatives, at least one of whom is a representative from the UMCES Graduate Student Council (GSC) to ensure input from and engagement with the graduate student body across lab units (*UMCES Graduate Student Council Handbook - Section VI-Shared Governance, page 37*). The GSC works closely with the DEIC to solicit feedback from students, convey their perspectives to the DEIC, and take the lead on implementing student-focused initiatives. Potential initiatives of particular relevance to graduate students include DEI educational opportunities, assessment of campus climate, development of an UMCES Code of Conduct, establishing an ombuds office, and improving inclusive faculty hiring and retention practices to ensure that students have access to supportive and understanding mentors (*Near-term DEIC Goals*).

The DEIC and GSC are currently coordinating with an external organization to facilitate an UMCES-wide cultural climate assessment, an effort that is being led by graduate students, faculty, and staff across several lab units. The results of this assessment will inform the structure and content of future trainings. In the past, UMCES faculty and staff have attended in-person workshops offered through UMCP's Lesbian, Gay, Bisexual, and Transgender (LGBT) Equity Center and the Rainbow Terrapin Network as well as other external trainings. The DEIC intends to coordinate such offerings

for the entire UMCES community in the future.

Recognizing that scores on the Graduate Record Examination (GRE) are poor predictors of future success in graduate school and can present a financial barrier to many students, and unfairly favor students who can afford GRE preparation materials and courses (*Miller, C., Stassun, K. A test that fails. Nature 510, 303–304 (2014)*), UMCES faculty led a successful effort to change MEES application requirements. The MEES program no longer requires prospective UMCES students to submit GRE scores with their applications. Prospective students may submit scores if they so choose, but they are not considered as a criterion for admission into the program (*UMCES Student Handbook, 2020- 2021*). UMCES faculty have worked with student applicants who may not meet the undergraduate GPA requirements of the UMD graduate school to have them admitted as non-degree seeking students. Depending on the success of these students in taking graduate classes, they may subsequently be admitted as regular students in the MEES program.

In addition to its graduate programs, UMCES is committed to providing meaningful training and research experiences for high school and undergraduate students. These internships help students, many of whom are from underrepresented groups in the geosciences, explore educational and career opportunities in STEM fields and provide valuable research experience to students interested in pursuing graduate degrees. Maryland Sea Grant participates in the National Science Foundation (NSF) Research Experience for Undergraduates (REU) program and provides paid marine research opportunities to undergraduate students on the Chesapeake Bay and beyond (*Maryland Sea Grant REU Program*) (Figure 4.2). IMET hosts a highly successful summer internship program in biology and environmental science for underrepresented students (*IMET Summer Internship Flyer 2020*). CBL provides paid research internships, mentorship, and other opportunities for undergraduate students at the College of Southern Maryland (CSM) through its Environmental Education Community College Collaboration (E2C3) initiative; it is currently planning to expand its efforts with Howard University and other 4-year programs (E2C3 Flier). CBL also developed the Tiny Bubbles Mentoring Project to provide education, outreach, and hands-on research experiences for CSM freshmen with the goal of exposing more women and community college students to research opportunities in STEM (*Lapham Lab - Tiny Bubbles*). HPL offers paid summer internships for students to learn about all aspects of oyster aquaculture through hands-on experience in its renowned oyster hatchery (*Horn Point Oyster Hatchery Internships*). HPL faculty have also developed an internship with the local Chesapeake College which emphasizes minority students. UMCES faculty at all of its laboratories provide paid seasonal jobs for local undergraduate students.

Recommendations

- Continue to recruit underrepresented minority students for high school and undergraduate internship programs.
- Recruit underrepresented minority graduate students using the UMCES/MEES Enhancement Funds program described under Question 1 above.
- Follow through with campus climate assessment(s), which will allow students to provide anonymous feedback on their experiences at UMCES
- Implement implicit bias and sensitivity trainings for faculty, staff, and students for improving mentorship

4. Are there established procedures for graduate student orientation and advising at UMCES?

UMCES has established procedures for graduate student orientation and advising including formal orientation for all and additional orientation for international students, written documentation for agreeing on mentorship expectations, lab specific orientations, as well as training on sexual harassment and right to know policies, and more.

Newly admitted students are emailed information to support their transition prior to orientation. An annual orientation for fall term incoming students across all the UMCES laboratories takes place in person. This serves a dual purpose of both orienting students to the UMCES mission, values, and expectations and procedures, and also building a peer network cohort across each of the individual laboratories. The orientation covers introductions of students and administrators, academic integrity, student and mentor expectations, and a description of resources available to students (*UMCES New Student Orientation Schedule Students, 2019*) (*UMCES Student Handbook, 2020- 2021, Section X Student Activities*). An online orientation is performed for the relatively few students who arrive in the spring semester, and they are encouraged to attend the fall orientation in person later that year.

Additionally, international students have unique cultural and immigration needs. The graduate student handbook provides some information tailored to incoming international students such as information about banking, housing and general cultural awareness (*UMCES Student Handbook, 2020- 2021, Section VII International Students*). All international students in the UMCP must participate in a mandatory full day orientation program that both addresses important immigration and visa policies, and also provides networking opportunities

for international students (*UMCP International Student Orientation*).

Because of the distributed nature of UMCES, an additional orientation takes place for each new student at the individual laboratory. These orientations include basic services such as acquiring an email address and other computer services, gaining keys for entry, and filing forms for health insurance and other benefits.

All employees, including graduate students, must participate in a Right to Know Lab Safety program designed to familiarize graduate students with safety best practices and how to learn the dangers of any chemical agents they may utilize in their research (*UMCES Laboratory Hazards: Right to Know*). Additionally, harassment training is required for all UMCES personnel, including graduate students, once every two years to inform them of their reporting rights and responsibilities (*UMCES Sexual Misconduct Resources, UMCP Policy and Procedure on Sexual Misconduct VI-1.60*).

Academic advising takes place through a diversity of resources. The primary advising occurs with the graduate student's faculty mentor. Additional advising comes from the student's committee members, the laboratory director, other laboratory faculty with whom the student interacts through teaching and other informal activities, and the laboratory education committee. Students are informed about typical roles and responsibilities in the student-mentor relationship during the graduate student orientation. The students are led through a template statement of mutual expectations that they can use with their advisor to better understand their role and the mentor role in graduate studies (*UMD GRA Statement of Mutual Expectations*). Formal academic advising is tracked through annual obligatory committee meetings with the student, advisor, and 2-4 committee members. The student's past academic and research progress is described and evaluated, and the student's plan for the future is presented. Each committee member must sign off on the student's annual progress report which is reviewed by the MEES director and is also held at the UMCP VP for Education office (*MEES Annual Progress Report Form*).

Laboratory directors typically meet annually with graduate students to provide an additional mentoring opportunity and to evaluate the quality of faculty mentorship. Each student also presents an annual student seminar managed by the laboratory education committee at which the student's research progress is presented to the entire laboratory community with opportunity for questions and further interaction. This is both a career development tool and also an opportunity for broader faculty participation in the mentoring of students. Each laboratory has its own unique and diverse informal student mentoring programs. For example, at HPL, faculty and alumni have monthly lunch meetings with students to discuss career training or any topic of interest to the student body.

Recommendations

- UMCP should build on and adapt the UMCP "Statement of Mutual Expectations" to facilitate agreed upon interactions and procedures for UMCP advisor-student relationships. UMCP recognizes the need to more formally encourage this initiative across all labs.
- UMCP should standardize the lab specific orientation to ensure uniformity of information.

5. How does UMCP help students deal with the geographically distributed nature of its facilities, form a coherent community, become familiar with resources and faculty, and enhance networking?

UMCP utilizes a variety of practices to help students overcome the distributed nature of the UMCP labs, form a more coherent community, be introduced to resources and faculty, and enhance networking. These include utilizing distance communication resources such as online video conferencing platforms (e.g. Zoom), inviting all students to lab specific seminars, supporting travel to other campuses and more. The range of formal and informal as well as student led practices allows for both remote and in-person opportunities that can aid in forming diverse communities inclusive of working parents, disabled individuals, and international students without transportation.

Formal opportunities to form peer and professional networks are key elements of the UMCP graduate education program. As outlined in Question 4, all incoming graduate students attend an in-person orientation (*UMCP New Student Orientation Schedule Students, 2019*). This is facilitated by the use of laboratory transportation and financial support from the UMCP laboratories to enable all students to attend. Additionally, MEES laboratories rotate the annual MEES Colloquium between facilities. Students' travel, hotel, and food are covered for this 1.5-day event. At the colloquium, a range of activities such as science communication tutorials, panels on career development, student presentations, and guest speakers take place (*2019 MEES Colloquium*). Keynote presentations on the state of UMCP from the UMCP President and the state of MEES from the MEES director and UMCP VPE provide an administrative context. Students have the opportunity to interact formally and informally with each other and with faculty and administration. The annual UMCP commencement also presents an opportunity for students to travel together to celebrate the achievements of students and faculty (*2021 UMCP Commencement*).

Other formal opportunities for students to develop networks across laboratories occur through student participation in the graduate student council (GSC), an organization representing graduate students at UMCP

(*UMCES Student Handbook, 2020- 2021, Section V*). Additionally, all MEES students come together for updates at the all-student meeting during the MEES colloquium (*MEES Colloquium Student Meeting_16oct2020*). Finally, to ensure that these opportunities and information are widely distributed beyond student leadership teams, the UMCES VPE Office works to bridge the distributed nature of the Institution by distributing a twice yearly newsletter with updates, resources, conferences, funding, and event summaries (*UMCES Student Newsletter December 2019*).

In addition to these formal opportunities that are supported financially by the institution, a wide range of more informal activities occurs. UMCES teaching occurs primarily through online video platforms. Thus, students from different lab groups, different laboratories, and different disciplines have the opportunity to discuss course material and to collaborate on class projects across laboratories. Several of the required UMCES classes (one required issue study group and Applied Environmental Science) explicitly center on the use of shared group projects that drive the development of peer networks across laboratory units (*MEES Course Requirements, MEES609A Applied Environmental Science Syllabus 2019*). In some courses, (e.g. Interconnected Earth Systems foundation course), one of the group activities takes place at UMCP in a central location, affording students the chance to meet their professors and fellow first year students in person (*MEES640 Interconnected Earth and Ocean Systems Syllabus 2020*). UMCES prides itself on highly interdisciplinary science, and as a result, students often interact with laboratory groups across UMCES, the nation, and the globe. These provide further opportunities for building diverse research networks and for learning about the scientific culture in other regions and laboratories.

Finally, UMCES students recognize the importance of developing peer and professional networks, and they have motivated the development of a number of activities to bring the student community together. For example, UMCES students formed a Society of Women in Marine Science (SWMS) chapter that sponsored an in-person workshop with funding from a variety of sources that brought more than 80 students, faculty, and staff together from UMCES laboratories as well as other marine science institutions in the region. All students may participate in SWMS activities (*Society for Women in Marine Sciences – UMCES Chapter*). UMCES students also formulated a chapter of the American Association of University Women (AAUW), a group founded to foster collaboration, discussion, and events that advocate social issues affecting students, faculty, and staff in higher education. UMCES labs also have other informal student groups such as writing groups, R (statistics) club, a microbial biotechnology club, and more (*UMCES Student Handbook, 2020- 2021, Section V*).

Recommendations

- UMCES should monitor and evaluate the success of each mitigation strategy to address the geographical diversity of the institution regarding student support.
- UMCES should continue the more general UMCES-wide virtual seminars that were conducted under COVID travel restrictions and also include UMCES-wide student meetings at regular intervals.

6. How does UMCES track, engage, and communicate with its alumni?

Alumni play key roles in UMCES programs, roles chiefly realized through sustained former student to former mentor interactions post-graduation. UMCES aspires to enhance more widespread and general alumni interactions through more formal tracking procedures.

Alumni are an esteemed and valued part of the UMCES community. In keeping with the mission of UMCES, alumni represent environmental science writ large, and have pursued diverse and rewarding careers in science, management, education, public service, and industry. UMCES prominently features a subset of alumni careers on their web page “Where are they now,” which features an astronaut, conservation scientists, a fish farmer, a biotechnology entrepreneur (a participant in the REEF program), an NGO chief executive, and an EPA administrator (*UMCES Alumni Profiles*). Alumni represent a key resource for student recruitment, workforce development and networking for our students, but also serve as advisors in evaluating education and other programs at UMCES. Many alumni retain science, education, and service collaborations with UMCES faculty throughout their careers.

Faculty remain the most important connection with alumni. Beyond graduation, alumni will interact with faculty for years to come in producing thesis-based publications, providing essential aid in career placement, guidance in grantsmanship, and nominations to advisory committees and career awards. In this way commencement is only a milestone with committed career mentorship extending years and even decades beyond graduation. Postgraduate mentorship is facilitated by the relatively low student to faculty ratio at UMCES (*UMCES Student Outcomes, 2020* and see Introduction). Faculty make extensive use of alumni by asking them to join virtual laboratory meetings, serve on graduate advisory committees, and in seeking job opportunities for recent graduates.

Beyond the individual connections faculty maintain with alumni, UMCES increasingly has sought to engage alumni as a community particularly as a resource for recruitment, workforce training, development activities, and advisory roles. At the MEES Colloquium, alumni have been invited as panelists to advise students on their diverse career

choices and what makes them competitive and valuable in these careers (*2018 MEES Colloquium*). An UMCES alumna, Dr. Suzan Shahrestani, who has started a successful aquaculture biotechnology company, was the keynote speaker at the 2021 UMCES Faculty Convocation. Alumni have delivered addresses at MEES Colloquia and have presented outreach presentations to the public (*Science for Citizens*). Alumni networking events are hosted by UMCES at key recurring conferences such as the Association for the Sciences of Limnology and Oceanography and Coastal and Estuarine Research Federation meetings, and alumni have been invited to celebrate past mentors at retirement and Professor Emeritus events. An alumna serves on the Board of Visitors (*UMCES Board of Visitors*).

A continuing challenge for UMCES is tracking alumni as the Center is too small to support staff devoted to Alumni services. Since 2017, the VP of Education office has been conducting exit polls related to employment information, career goals, and contact information of cohorts of graduating students as well as maintaining a database of this information (*UMCES Alumni Questionnaire*). There are also initiatives to use these interviews to promote student recruitment. Mobility is a hallmark of many alumni, so tracking will still depend on continuing connections with faculty.

Recommendation

- Within two years, the VP of Education Office should develop a database and portal tools to aid in comprehensively tracking and communicating with UMCES alumni.

7. How and how often does UMCES assess the effectiveness of its student support services?

UMCES assesses its student services through various means with substantial opportunities for student input. Student feedback and discussion are facilitated by a variety of activities, notably graduate student representation at all levels of governance.

Student representatives from the UMCES GSC attend annual “Meet and Confer” meetings with UMCES administration. In addition to GSC representatives, this meeting includes the Vice President for Education, the Assistant to the Vice President for Education, the Vice President for Administration, and the Human Resources Director (*UMCES Meet and Confer Meeting Minutes, 2020*). The President attends GSC meetings on several occasions each year in order to directly receive student feedback and discuss concerns and meets informally with groups of students to discuss a variety of topics. The Chair and Co-Chair of the GSC also maintain open lines of communication with the President throughout the year to address immediate concerns that may arise among the student body.

The Assistant to the VPE is an ex officio member of the Graduate Student Council (*UMCES Graduate Student Council*). This provides a channel for feedback on student support services, and helped lead to the formation of the UMCES Mental Health Committee, creation of the Graduate Student Academic Quick Facts Sheet (*UMCES Graduate Student Academic Quick Facts*), Financial Quick Facts Sheet (*UMCES Graduate Student Financial Quick Facts*), and improvements to the My-UMCES graduate education resources webpage. The Assistant to the VPE meets with the GSC annually to review and revise the student handbook to ensure that student questions and concerns are addressed.

Graduate students have representation on several additional committees throughout UMCES and the University System of Maryland (USM), which allows them to provide direct input on institutional initiatives and services (see Question 2 above).

To assess progress and identify areas for improvement, the UMCES Student Council completes an annual report to the USM Student Council regarding shared governance and other concerns (*USMSC_Campus_Report_2020*). GSC representatives also solicit feedback from the students at their respective labs on an ongoing basis.

UMCES completed its first Institutional Assessment in 2018 (*UMCES Institutional Assessment, 2018*), which surveyed students, staff, and faculty on topics including student support. Students’ attitudes were overall judged to be fair with respect to student support and services at UMCES, with the need for improved mental health services and an UMCES Ombuds program indicated by multiple respondents.

Recommendations

- Regularly poll students on the adequacy of student services at UMCES.
- Use the 2018 UMCES Institutional Assessment to guide the Office of the Vice President for Education and the Executive Council in identifying areas to improve student services at UMCES laboratories.

COVID-19 Impacts

UMCES closed its four laboratories to on-site research activities on March 13, 2020, with all students and faculty subsequently engaged in teleworking to continue their graduate studies, teaching and research. Access to the campuses was restricted to essential personnel for building maintenance and the care of animals and plankton cultures.

UMCES’s graduate education, primarily exercised through the system-wide Marine Estuarine Environmental Sciences (MEES) program, began its transition to the online environment almost 30 years ago. UMCES was one of the original pioneers of the USM Interactive Video

Network (IVN), which allowed synchronous delivery of lectures from individual UMCES laboratories throughout the USM. Online Learning Management Systems were also adopted, and MEES instruction continues to keep pace with technological enhancements. Through the years as technology has advanced and evolved, UMCES online instruction has adapted to take advantage of new hardware and software platforms. Thus UMCES was well prepared to adapt to all on-line classes the remainder of Spring semester 2020, Fall semester 2020, and Spring semester 2021.

New UMCES graduate students were admitted in Fall 2020. Because of travel restrictions, a number of international students elected to stay in their own countries. These students were offered a fellowship by the University of Maryland that covered their tuition costs for Fall 2020 and Spring 2021, thus ensuring they did not fall behind in their coursework due to COVID-19.

Graduate research stipends and teaching assistantships for UMCES students were maintained during all phases of the pandemic. UMCES students applied for and received funds to allow them to register for virtual science conferences. Students conducted both laboratory and field research during Phase 1 and 2, however, the early shut down and restricted research regulations have resulted in some students needing additional time to complete the requirements for UMCES M.S. and Ph.D. degrees. Where possible we have used internal sources of funds and grant funds to support these student cases of extended tenure at UMCES. Other sources of funds have included CARE funds distributed by the USM and graduate student enhancement funds awarded to the MEES program by the USM.

The UMCES Education Office facilitated virtual orientation in Fall 2020 and Spring 2021 to all admitted students. Students were also periodically reminded of resources available to them, including reaching out to the office for support along with mental health resources that are available in times of need. In June 2020, the UMCES President, VPE, and GSC Chair worked together to provide additional support and resources to students in the wake of both the pandemic and current social justice movements (*2020 Letter from Goodwin to Students*).

UMCES faculty advisors regularly met with their students over Zoom. Weekly virtual UMCES science seminars from experts throughout the U.S. were conducted with student participation. Our UMCES student seminars were also conducted virtually, with time after the seminar devoted to discussion and social interactions. Students submitted feedback to the USM Student Council on the state of shared governance and student support at UMCES during the COVID-19 pandemic, for which the UMCES response to students during the pandemic was viewed favorably (*UMCES April 2020 Shared Governance Campus Report COVID-19*).

Connections

There are several connections between this chapter and other chapters. We detail student participation in shared governance at the UMCES and USM level (WG7), UMCES efforts on diversity, equity, and inclusion in relation to student recruitment and support (WG2), and professional development opportunities for UMCES students (WG3).

Conclusions and Recommendations

Our working group's findings indicate that UMCES is in full compliance with the criteria indicated in Standard IV, "Support of the Student Experience." In support of the UMCES mission statement that "UMCES faculty members advise, teach, and serve as mentors to many graduate students enrolled in USM institutions," UMCES has committed to supporting its students throughout their tenure in graduate school. Policies and procedures are in place to ensure that our students continue to have access to necessary financial and other broad student support resources, from wellness to professional development. UMCES is responsive to student requests for additional support and we are committed to grow and improve in areas that we have indicated in our recommendations.

We posed seven questions to focus our analysis of support of the student experience at UMCES which resulted in the following recommendations:

- UMCES should enhance its website regarding student financial information, including adding available student funding and fellowships, clarifying the need for funding once accepted, clearly stating information about stipend levels and benefits, and outlining the cost of living at the various campuses
- UMCES should review the Graduate Assistant (GA) appointment letter to ensure comprehensive and uniform financial information is being relayed to all incoming GAs
- While UMCES students have access to available ombuds persons through the campuses with which they matriculate, UMCES should continue its work toward the formation of an ombuds office or group within UMCES to better serve the needs of the student population
- UMCES should continue to recruit underrepresented minority students for high school and undergraduate internship programs.
- UMCES should recruit underrepresented minority graduate students using the UMCES/MEES Enhancement Funds program described under Question 1.
- UMCES should continue to assess student needs on a regular basis, for example through campus climate assessments and regular Institutional Assessments, which will allow students to provide regular, anonymous feedback on their experiences at UMCES.

- UMCES should institute implicit bias and sensitivity trainings for faculty, staff, and students for improving mentorship.
- UMCES should continue to develop and review student-advisor mutual expectations documents to improve communication and understanding.
- UMCES should standardize the lab specific orientation to ensure uniformity of information delivery.
- UMCES should continue the more general UMCES-wide virtual seminars that were conducted under COVID travel restrictions and also hold virtual UMCES-wide student meetings at regular intervals.
- UMCES should monitor and evaluate the success of each mitigation strategy addressing student support issues arising from the geographical diversity of the institution.
- Within two years, the VP of Education Office should develop database and portal tools to aid in comprehensively tracking and communicating with UMCES alumni
- UMCES should continue to poll students on the adequacy of student services at UMCES and should use the 2018 UMCES Institutional Assessment results to guide future improvements.

Chapter 5

*Educational Effectiveness Assessment***Purpose**

Working Group 5 addressed MSCHE Standard V - “Assessment of student learning and achievement demonstrates that the institution’s students have accomplished educational goals consistent with their program of study, degree level, the institution’s mission, and appropriate expectations for institutions of higher education.” The Working Group specifically addressed the following questions, designed to explore Standard V in depth:

1. Are UMCES’s educational goals at the institutional and degree program levels clearly articulated? Are these goals aligned and coordinated with those of UMCES’s academic partners?
2. Does UMCES have clearly defined learning outcomes at the student, course, program, and institutional levels?
3. How are student learning outcomes assessed, and how effective is UMCES in using assessment results to improve student learning?
4. What assessment procedures are in place at the course, program, and institutional levels? How are assessment procedures used for course and program improvement?
5. How does UMCES align its assessment procedures with those of its academic partners?
6. How is UMCES’s educational effectiveness assessment process itself evaluated and improved? How often are assessment results and procedures reviewed?

Scope

Working Group 5 evaluated how well UMCES meets Middle States expectations with respect to Educational Effectiveness Assessment. The evidence that Working Group 5 used to evaluate how well UMCES addresses standard V was identified during the self-study design and during the course of the self-study. More specifically, Working Group 5 evaluated the clarity and completeness of UMCES’s educational goals, and if and how appropriate and effective assessment procedures are used to demonstrate that learning and achievement by UMCES students are consistent with their program of study, degree level, and the institution’s mission. Working Group 5 also evaluated how assessment results are considered and used to further improve the curriculum and educational effectiveness across all levels, as well as how the assessment process itself is periodically evaluated to improve educational effectiveness. Working Group 5 concluded that the information it evaluated was sufficient for allowing it to address its six research questions.

Analysis and Problem-Solving Methods

Working Group 5 met once monthly between January 2020 and March 2021. Each meeting focused on one of the six questions that Working Group 5 was tasked

with addressing. Prior to each meeting members of Working Group 5 read and evaluated potential sources of evidence and took detailed notes in a shared Google Document about if/how that piece of evidence addressed the question. During its monthly meetings the members of Working Group 5 discussed the evidence that was found, and notes of these discussions were recorded. These notes were used as the basis for the responses to the questions addressed here.

Results

1. Are UMCES’s educational goals at the institutional and degree program levels clearly articulated? Are these goals aligned and coordinated with those of UMCES’s academic partners?

UMCES educational goals at the institutional and degree program levels are clearly articulated, and these goals are aligned and coordinated with UMCES’s academic partners. In some cases, these goals need to be updated and made more easily discoverable.

At the institutional level, UMCES broad educational goals are clearly stated on the education home page ([UMCES Education Overview](#)):

As one of the nation’s oldest environmental research

institutions, the University of Maryland Center for Environmental Science strives to train and inspire our nation's next generation of environmental scientists. Since 1925, UMCES has connected experienced environmental scientists to aspiring students wanting to learn more about our natural world.

While we primarily focus on graduate studies, we also offer courses for undergraduates, K-12 students and their teachers, and environmental professionals looking to better understand specific environmental problems. With concerns growing about the long-term sustainability of our planet's environment, UMCES is committed to helping future generations harness the power of science and develop a deeper understanding of how it affects our lives and world. We also have educational opportunities for the public, including free presentations at each of our laboratories.

UMCES educational aspirations for the near future are clearly stated in the 2019 Strategic Initiatives document at [UMCES Strategic Initiatives, 2019](#), under the heading UMCES transforms lives through education:

UMCES will build on its outstanding educational programs of research-based graduate programs, internship programs for undergraduates, outreach programs to K-12 students and teachers, and informal learning programs for the public. UMCES will expand professional training for our current students and working environmental professionals. We will cultivate new collaborations with University System of Maryland partners. We will develop innovative programs to enhance diversity and inclusion, grow our student body, expand our educational reach, and offer greater service to the citizens of Maryland.

At the Program level, UMCES participates successfully in three different USM graduate programs with six academic partner campuses, as well as various grant-supported undergraduate, community college, teacher, and high school summer internship programs. Coordination and cooperation towards developing and promulgating program goals are complex tasks under these circumstances, but in general UMCES program goals are clearly stated and consistent with our educational partners. At present, all UMCES M.S. and Ph.D. degrees are research-based. As stated in UMCES 2015 Accreditation Self-Study, M.S. and Ph.D. degrees at UMCES include (1) in-depth study of the relevant scientific literature, (2) independent thinking and problem solving in field work, laboratory work, and/or simulation modeling, (3) effective scientific writing, and (4) effective scientific communication.

UMCES's primary and dominant graduate education program is the USM Marine Estuarine Environmental Sciences (MEES) program. The program is administered through an office at UMCP, but it is a partnership among five research campuses of the USM including UMCES. UMCES students comprise a plurality of the MEES student body, UMCES faculty teach more than 90% of MEES courses, and UMCES is the primary driver of MEES

Program policy and curriculum. Thus, the MEES program goals articulated on the MEES website at MEES Mission and [MEES Program Overview](#), are closely aligned with the UMCES goals described above and on the UMCES website at [UMCES MEES Program Overview](#).

UMCES also supports a small number of graduate students who matriculate through the Graduate Program in Life Sciences (GPILS) based at the UMB. These students are based at UMCES IMET Laboratory in Baltimore. The UMCES GPILS web page ([UMCES GPILS Homepage](#)) has several links to the GPILS web site at ([UMB GPILS Homepage](#)), but descriptions on the UMCES web page need updating to reflect recent changes in GPILS.

UMCES faculty at the Appalachian Laboratory (AL) also participate in the Frostburg State University (FSU) Masters program in Biological Sciences, with two tracks in Wildlife/Fisheries Biology ([FSU Masters of Science in Wildlife and Fisheries Biology Program](#)) and Applied Ecology and Conservation Biology ([FSU Masters of Science in Applied Ecology and Conservation Biology](#)). Courses offered by AL faculty are cross listed at FSU and faculty at AL serve on the committees of FSU graduate students. UMCES web pages that describe these programs ([FSU Masters in Biology](#)) express the essential characteristics and goals of the AL programs. The UMCES pages need updating to be better synchronized with the language and structure of current FSU program descriptions.

At a more granular level, the near-term operational goals for the UMCES graduate education program are similar to those expressed in the 2018 Accreditation Progress Report. Paraphrased from the report, these goals include:

1. UMCES will continue to lead the organization, coordination, and forward planning of the MEES curriculum. Through the establishment and effort of the UMCES PCC we now offer a stable and complete set of courses to facilitate student learning and faculty planning.
2. Another near-term goal is to use assessment of student learning outcomes to improve our education programs. We will continue to work with the MEES program and MEES partner institutions to coordinate course offerings and assessment of learning outcomes across the MEES program.
3. We also seek expansion of our student base through increasing enrollment in the MEES program, cross-listing appropriate courses as upper-level undergraduate courses and promoting the MEES curriculum across the USM.

Other goals, expanded upon elsewhere in this self-study document, include continued improvements in student support services, increasing participation by under-represented minorities in our educational programs, growing the number and variety of cooperative M.S. degree programs, implementing extended graduate education offerings, and increasing the size and stability

of sources of financial support for current and prospective graduate students.

Recommendations

UMCES broad educational goals (*UMCES Education Overview*) should be made easier to discover on the UMCES website. In addition, UMCES web pages need updating to be better synchronized with the language and structure of the current MEES website and program descriptions, as well as the GPILS and FSU websites and program descriptions.

2. Does UMCES have clearly defined learning outcomes at the student, course, program, and institutional levels?

UMCES has developed clearly defined learning outcomes at the student and program levels, has mostly completed implementation of clearly defined learning outcomes at the course level, and is continuing to clarify the learning outcomes at the institutional level (Figure 5.1).

UMCES’s approach to graduate education throughout its history has followed its institutional mission, emphasizing

a combination of graduate-level classroom instruction, student research and its communication, and science application and outreach. Educational outcomes have largely been defined through each student’s graduate committee, based on academic performance and evaluations of a series of presentations, defenses, and committee meetings. While rigorous and effective, these largely qualitative evaluations were not clearly or consistently defined at the student, course, program, or institution level or used to formally assess learning or to improve learning outcomes (*UMCES MSCHE Self-Study 2015; pages 43-46, 50-51*). Following its 2015 self study, UMCES realized the need for clear learning outcomes, which was reinforced by the MSCHE evaluation team (*MSCHE Initial Accreditation Letter UMCES; page 1*). Since gaining accreditation in March 2016 UMCES has made significant progress toward defining learning outcomes in its graduate education programs (Table 5.1), as discussed below.

Within the UMCES Graduate Faculty Council, two subcommittees were established to develop learning outcomes and assessment procedures: the UMCES PCC and the UMCES/MEES joint LOA committee (*UMCES Accreditation Progress Report March 2018; pages 7-9*). The PCC serves to ensure the quality, consistency,

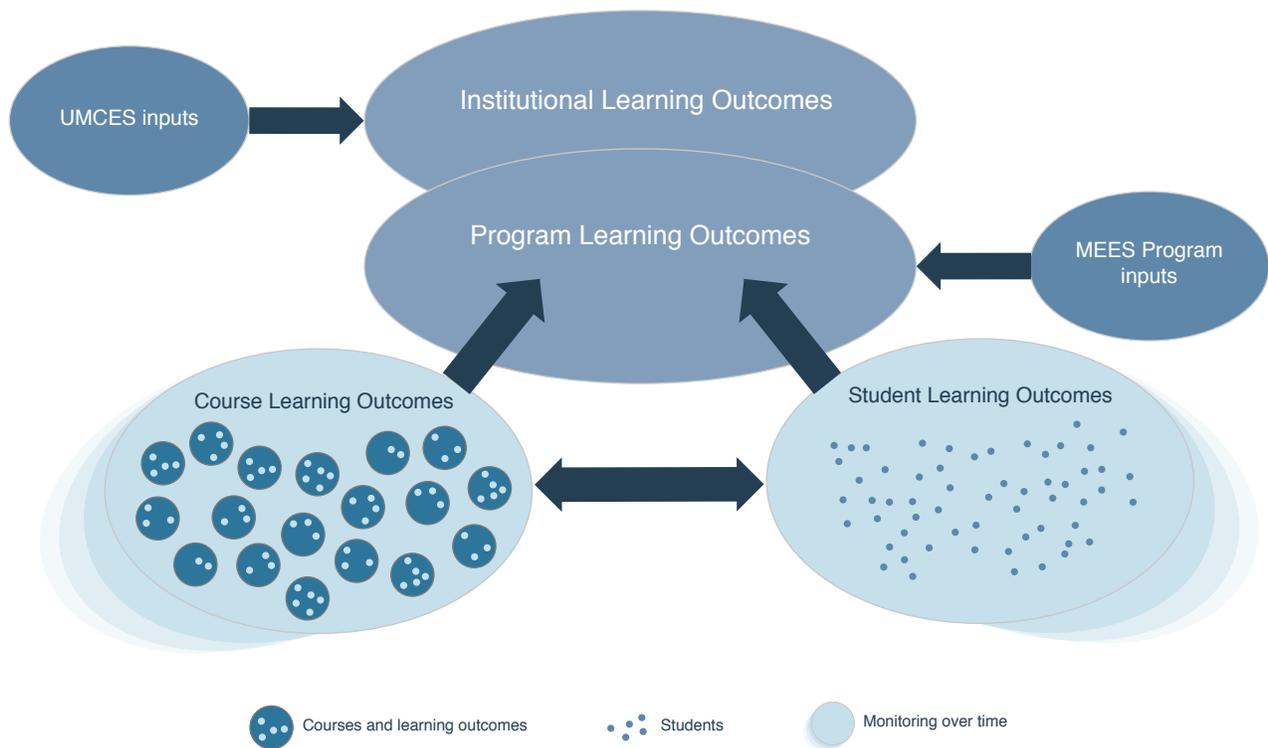


Figure 5.1 – Diagram illustrating the relationship between learning outcomes at various levels for UMCES and the MEES program. For Course Learning Outcomes, each dark blue dot represents a course, and the smaller light blue dots represent the defined learning outcomes for that course. For Student Learning Outcomes, each blue dot represents an individual student. The overlapping background layers for Course and Student Learning Outcomes represent tracking through time responding to course improvements at the Course level, and responding to committee meetings, written and oral defenses, and other major milestones at the Student level. Both Course and Student Learning Outcomes support the Program Learning Outcomes, which in turn support Institutional Learning Outcomes. The overlap of the levels represents their interconnections. Additional information may inform the program and institutional learning outcomes from various sources, represented by MEES Program inputs at the program level and UMCES inputs at the institutional level.

and coherence of UMCES educational offerings by reviewing and approving new and existing courses, helping to integrate UMCES educational offerings within the MEES curriculum, and ensuring that course learning outcomes are clear and appropriate (*UMCES PCC Charge and Composition*; page 1; *UMCES Course Creation Guidelines, page 1*). The joint UMCES/MEES LOA committee works with the UMCES VPE and MEES Offices to investigate and recommend implementation of methods for assessing learning outcomes at the student, course, and program level (*UMCES Learning Outcomes Assessment Committee Charge, pages 1-4*).

At the student level, the UMCES program learning

Date	Accomplishment
2014–2015	UMCES Self-Study for Initial MSCHE accreditation
Spring 2016	UMCES accredited by MSCHE, including request for more clearly defined and assessed learning outcomes
Spring 2017–	UMCES PCC committee active
Spring 2018	Accreditation progress report submitted to MSCHE
Spring 2018	Accreditation progress report submitted to MSCHE
Spring 2019	Procedures for course learning outcomes implemented
Spring 2019–	UMCES joins UMCP Graduate Outcomes Assessment Pilot Program
Fall 2019	UMCES/MEES learning outcomes assessment (LOA) committee active
January 2021	Program learning outcomes approved by LOA committee

Table 5.1 – Major events within the history of the assessment of student learning and achievement within UMCES.

outcomes (*UMCES Learning Outcomes Assessment Committee Charge, page 2*) serve as a guide for individual student learning. The program learning outcomes were designed to set the goals that UMCES expects each student to meet by the time they complete their graduate program (*A Vision for MEES, 2015 0212, page 9; UMCES Learning Outcomes Assessment Committee Charge, page 2*), and they are clearly defined and articulated. These learning outcomes documents were provided to the faculty for comment during their development and are made available through the UMCES PCC and LOA committees.

UMCES has taken several steps to clearly define learning outcomes at the course level and has developed procedures to support instructors in their creation. Faculty who propose a new course must indicate which of the program learning outcomes the course might satisfy, and the level of the course material (Introduction, Reinforcement, or Mastery; Table 5.2) with regard to the identified program learning outcomes. This information must be provided along with a tentative syllabus (*UMCES New Course Proposal Form, pages 1-2*). A syllabus template that uses a consistent format across all courses has also been established, which provides a section for faculty to clearly state the learning outcomes for their course (*UMCES Syllabus Template, Nov 2019, pages 1-3*). At present, all courses taught by UMCES faculty contain learning outcomes in their syllabi. A reference document has been created to guide faculty on crafting

appropriate learning outcomes for their courses. This guide emphasizes that course learning outcomes are what students are expected to be able to do at the end of a course, and provides tips to crafting the language of these learning outcomes (*UMCES Course Creation Guidelines, page 6*). The UMCES PCC Committee reviews and provides feedback to faculty to ensure that proposed course learning outcomes are clearly expressed and appropriate (*UMCES PCC Charge and Composition, page 1*). UMCES evaluates how each course addresses specific program learning outcomes (Map of how courses fit into learning outcomes; see Table 5.3 at end of this chapter). These procedures (1) encourage faculty to focus their teaching on their stated learning outcomes and (2) help the students learn by providing them with expectations for what they will learn, which empowers them to take responsibility for their learning and (3) ensure that student progress in courses aligns with student and program learning outcomes.

As noted previously, UMCES has clearly defined learning outcomes at the program level (Table 5.2). In particular, the LOA committee vetted and revised the 4 program learning outcomes and 5 research learning outcomes that UMCES students are expected to meet by the time they complete their degree (*UMCES Accreditation Progress Report March 2018, pages 11-12*). In doing so, it created two sets of learning outcomes: one for M.S. students and another for Ph.D. students, reflecting the different expectations of those student groups. The LOA committee solicited and received input from the UMCES faculty on these learning outcomes, which were approved in fall 2019 (*MEES Learning Outcomes, final fall 2019, page 1*).

UMCES’s learning outcomes at the institutional level are not yet clearly defined as such, but the institution’s educational goals and aspirations (see response to question 1 above) and mission statement (to “result in a comprehensive understanding of our environment and natural resources, helping to guide the State and world toward a more sustainable future”; *UMCES Mission Statement Final, 2018*) include language that describes the objectives of the UMCES educational program. All UMCES students must (1) conduct original scientific research that leads to discovery, (2) integrate or synthesize scientific information, and (3) apply scientific knowledge to solve real-world problems (*UMCES MSCHE Self-Study 2015, page 37*). These existing statements will be used to help develop clearly defined learning outcomes at the institutional level within the next year.

Recommendations

Learning outcomes at the student and program levels are well established and clearly articulated, and articulation of the course learning outcomes is mostly complete. The learning outcomes of UMCES institutional learning outcomes need to be better articulated and widely disseminated, in a document such as the institutional mission statement. The LOA committee should address this deficiency within the next year.

Master's Degree

Program Learning Outcome 1: Demonstrate working knowledge and comprehension of the fundamentals of environmental sciences within a disciplinary grounding.

Program Learning Outcome 2: Synthesize this disciplinary grounding and apply the resulting knowledge in an interdisciplinary context towards addressing important societal problems.

Program Learning Outcome 3: Learn and apply essential professional skills for scientific careers.

Program Learning Outcome 4: Under supervision, define, conduct, interpret, and communicate original research.

Research Learning Outcome 1: Understand and synthesize pertinent information from the body of published scientific literature.

Research Learning Outcome 2: Conduct original research following scientific principles and protocols.

Research Learning Outcome 3: Analyze and interpret data from an original research project.

Research Learning Outcome 4: Write original research findings for a scientific audience, ideally at a standard suitable for publication in an appropriate, peer-reviewed scientific journal.

Research Learning Outcome 5: Effectively communicate a technical summary of their research effort to a scientific audience in an oral presentation.

Ph.D. Degree

Program Learning Outcome 1: Demonstrate deep knowledge and thorough comprehension of the fundamentals of environmental sciences within a disciplinary grounding.

Program Learning Outcome 2: Synthesize this disciplinary grounding and apply the resulting knowledge in an interdisciplinary context towards addressing important societal problems and the advancement of science.

Program Learning Outcome 3: Learn and apply essential professional skills for scientific careers.

Program Learning Outcome 4: Independently define, conduct, interpret, and communicate original research.

Research Learning Outcome 1: Understand and synthesize pertinent information from the body of published scientific literature.

Research Learning Outcome 2: Plan, design, and conduct original research following scientific principles and protocols.

Research Learning Outcome 3: Analyze and interpret data from an original research project.

Research Learning Outcome 4: Write original research findings for a scientific audience, ideally at a standard suitable for publication in an appropriate, peer-reviewed scientific journal.

Research Learning Outcome 5: Effectively communicate a technical summary of their research effort to a scientific audience in an oral presentation.

Table 5.2 – Program learning outcomes and research learning outcomes for MEES Master's and Ph.D. Degrees.

3. How are student learning outcomes assessed, and how effective is UMCES in using assessment results to improve student learning?

UMCES has developed and, as of January 2021, initiated procedures and quantifiable metrics to assess student learning during annual committee meetings (M.S. and Ph.D.), oral defenses (M.S. and Ph.D.), and written M.S. thesis and Ph.D. dissertation defenses. Ongoing efforts are focused on developing procedures and metrics for assessing student learning in three specific required courses and during Ph.D. comprehensive examinations. It is an institutional priority to develop and use assessment results to improve student learning in the coming semesters.

UMCES has trained hundreds of graduate students throughout its history. Students in UMCES have near-perfect retention and success rates, complete their degrees in a reasonable amount of time, receive awards for presentations of their research at national and international conferences, and develop successful careers following graduation (*UMCES Student Outcomes, 2020*, and see Figure I.4). This, combined with the high quality of research products produced by UMCES graduate students, demonstrates their success in

obtaining a high level of learning.

UMCES has historically relied on each student's graduate advisory committee to assess the progress and achievement of each student. Such assessments consist of summaries of success, conditional success, or failure at each program event (e.g., annual committee meetings, comprehensive exams, and proposal and final defenses), along with recommendations for improvement or revision of research plans or products, if necessary. Assessment of student learning in courses has been evaluated by instructors through traditional means (e.g., performance on quizzes, exams, and class projects). However, these assessment tools did not necessarily target specific learning outcomes. Informal assessment also occurs at various times in the career of a student, such as during brown-bag seminars (*CBL Faculty Handbook - Hosting Seminars*) or presentations at the annual MEES colloquium (*MEES Colloquium 2020*). Although rigorous, such evaluations did not produce quantifiable metrics that promote standardization, tracking, comparison, and assessment of student learning.

At the individual student level, program learning outcomes are goals that UMCES expects each student to meet by the time they complete their graduate program (*A Vision for MEES, 2015 0212*, page 9; *UMCES Learning Outcomes Assessment Committee Charge*, page 2).

Program learning outcomes are assessed at the program level by integrating student performances across the spectrum of student learning outcomes. (Figure 5.1). Since gaining accreditation UMCES, in conjunction with its partner institutions in the MEES program, has made steady progress in developing and deploying a specific LOA assessment procedure, including quantifiable assessment metrics and rubrics (*MEES Graduate Outcomes Assessment Pilot Program Report*, pages 1-3) to evaluate and track student achievement of the now clearly defined student learning outcomes. The precise nature of this procedure was not determined in 2018 (*UMCES Accreditation Progress Report March 2018*, page 13), but since then drafts were developed, discussed, and revised by the LOA committee in consultation with the broader faculty (*MEES Learning Outcomes Assessment Possibilities; MEES Learning Outcome Assessment Protocol, May 2020*, pages 1-4; *MEES Learning Outcomes -Broad Curriculum Map*, pages 1-3; *MEES LOA Committee Meeting Summary July 1, 2019*; *MEES Graduate Outcomes Assessment Pilot Program Report*, pages 1-3).

The LOA committee has agreed that assessment of student learning will occur at several curricular milestones, including during 3 required courses (i.e., the Foundation course, Applied Environmental Science, and an Issue Study Group course) that were designed around particular learning outcomes, as well as more traditional milestones for graduate students, including annual committee meetings, comprehensive exams, oral defenses, and written theses and dissertations. The assessment data will be stored in a database to allow the data to be parsed in various ways, such as by institution or Foundation area. The database will be administered by the MEES office, which provides a central location to store the data for all partner institutions involved with the MEES program.

In January 2021 UMCES began using procedures and quantifiable rubrics and metrics that promote standardization, comparison, and assessment of student learning for use at annual committee meetings (M.S. and Ph.D.), oral defenses (M.S. and Ph.D.), and written thesis (M.S.) and dissertation (Ph.D.) defenses (*MEES Programmatic Assessment Forms, Dec 2020*). In their first year of implementation (i.e., 2021), student learning assessments will be in a trial phase and each LO will be assessed, with the single year of data available. Faculty will be queried throughout this trial phase so that recommendations can be made for improving the rubrics, performance targets, and processes for the following year (*MEES Learning Outcome Assessment Protocol, May 2020*).

In 2021 the UMCES LOA committee will focus on incorporating student learning outcomes into course learning outcomes by developing procedures and metrics for assessing student learning in specific required courses (i.e., the Foundation course, Applied Environmental Science, and an Issue Study Group

course) and for Ph.D. comprehensive exams. The LOA committee aims to complete development of these procedures and metrics, in collaboration with the instructors of these classes, by the end of 2021, with the goal of implementing these procedures and assessments during the spring 2022 semester.

To date, UMCES has not used assessment results widely to improve student learning. However, the plan that UMCES is developing and implementing to assess student learning outcomes includes guidance for steps required to improve student learning. For example, assessments will be compiled and data analyses will be conducted annually by the LOA committee, and committee reports on trends and recommendations regarding UMCES learning outcomes assessments will be sent to the UMCES VPE. It will be the responsibility of the UMCES VPE to implement any changes that are recommended, with some oversight and shared responsibility with the MEES director to ensure that needed programmatic improvements are followed (*MEES Learning Outcome Assessment Protocol, May 2020*, page 1).

Recommendations

UMCES should prioritize the goals of the LOA committee, which include implementing a trial phase of the learning outcomes assessment plan for annual committee meetings, oral defenses, and written theses and dissertations in 2021, as well as completing the remainder of the assessment plan by the end of the fall 2021 semester. By year end 2021 UMCES should take steps to improve the assessment process, such as asking faculty to identify areas for improving rubrics, performance targets, and processes for the following year. UMCES should implement its plan to assess and improve student learning outcomes as a pilot program during the 2021-2022 academic year.

4. What assessment procedures are in place at the course, program, and institutional levels? How are assessment procedures used for course and program improvement?

UMCES has developed and implemented procedures to assess learning at the course and program levels. Assessment procedures need to be developed at the institutional level and assessments need to be more widely used for course and program improvement.

UMCES historically relied on individual instructors and teaching evaluations completed by students for course-level assessment. However, course assessment was ad hoc as no formal procedures for course assessment by instructors existed, and course evaluations are more indicative of perceived satisfaction by students rather than an assessment of the development of new skills by students or student performance relative to specific learning outcomes (*UMCES MSCHE Self-Study 2015*,

page 44). Since UMCES gained accreditation, the Foundation courses that were implemented within the new MEES Curriculum and several elective courses used learning outcomes surveys completed by students regarding the extent to which they believe the course met the stated learning outcomes (*Historical UMCES Course Learning Outcomes Assessment Summary*). For example, a class that is offered annually and required of all students in the MEES program, MEES 609A (*Applied Environmental Science*), pioneered student surveys specific to course and program learning outcomes that were conducted across multiple years to identify areas where students believe they were not learning what the faculty had hoped (*MEES609A Learning Outcomes Survey*). The course professors then revised the course content based on prior assessments and found that student learning had improved in subsequent years (*MEES609A Outcomes Survey Example of Results*). However, these too suffer from the limitation of being based on student perceptions about what they have learned. The instructors of one class, MEES607 (Quantitative Methods), took a different approach by matching stated learning outcomes to assignments and tests. Based on assignment and test grades, they gauged if specific learning outcomes were met (*MEES607 Grades Internal LOA Evaluation 2017* and *MEES607 Quantitative Methods Course LO Evaluation 2018*). Those results, along with student course learning outcome surveys, were then used to improve the course's subsequent offerings (*Historical UMCES Course Learning Outcomes Assessment Summary*). UMCES has further developed this latter approach for assessment across courses.

A high priority for UMCES during the past several years has been to develop more formal, rigorous, and quantitative procedures for faculty-driven assessment of learning at the course level. For example, in 2018 UMCES revised its course creation guidelines to require instructors to state how they assess learning outcomes (*UMCES Course Creation Guidelines*, page 6; Table 1). Common examples of assessment procedures at the course level include homework assignments, class discussions, exams, presentations, and final papers (*MEES698R Stable Isotopes 2019 syllabus*). Faculty are also required to indicate what percentage of the course grade is assigned to each activity (*UMCES Syllabus Template, Nov 2019*). Some faculty have begun to match the learning outcomes and grading/assessment procedures for their courses (MEES609A Applied Environmental Science Syllabus 2019), and in May 2020 Working Group 5 asked the UMCES PCC to implement this procedure for all courses (*UMCES PCC Agenda May 2020* and *UMCES PCC Meeting Summary May 2020*). This matching exercise is aimed at helping faculty (1) to assess each of their learning outcomes and (2) to not

assess topics that are not learning outcomes and (3) to discover potential areas for course improvement. Further, this approach empowers students to take responsibility for their learning. UMCES has created guidance to help faculty develop assessment procedures to use at the course level (*UMCES Course Creation Guidelines; UMCES Syllabus Template, Nov 2019; UMCES Learning Outcomes Assessment Committee Charge*). This guide includes recommendations on approaches/methods for measuring student achievement of outcomes, analyzing the results, and using the results to make subsequent course improvements (*UMCES Learning Outcomes Assessment Committee Charge; UMCES Accreditation Progress Report March 2018*).

Assessment of learning outcomes at the program level has also been a priority for UMCES since gaining accreditation. Previously, such assessments within UMCES were largely qualitative and based on ad hoc summaries of the success of students at various phases of their studies, including comprehensive exams, course work, proposal and dissertation defenses, as well as by metrics of student recognition at scientific conferences and student achievement through publication (*UMCES MSCHE Self-Study 2015, pages 40 and 42*). Student success during their studies is an important component of assessing educational effectiveness, but UMCES had not previously used such data for formal, regular, and quantitative assessment at the program or institutional level. As mentioned above, UMCES has made steady progress in developing processes for assessing student and course learning outcomes (*MEES Graduate Outcomes Assessment Pilot Program Report, pages 1-3; MEES Learning Outcomes Assessment Possibilities*), program performance targets (*Notes from June 24 meeting of LOA committee meeting; MEES Learning Outcome Assessment Protocol, May 2020; MEES Graduate Outcomes Assessment Pilot Program Report, pages 1-3*), as well as the logistics of conducting assessments and using assessment results for program improvement (*UMCES Learning Outcomes Assessment Committee Charge, pages 1-4*). The student and course learning outcomes provide the basis for assessing program learning outcomes (Figure 5.1). As mentioned above in response to question 3, these data will be aggregated and analyzed annually at the program level by the LOA committee and a report on program-level learning outcomes assessment will be sent to the UMCES VPE.

As stated above in response to question 2, UMCES's learning outcomes at the institutional level are not clearly defined and thus assessment procedures also need to be developed at the institutional level; since institutional learning outcomes are targeted within the next year, assessment procedures will follow within the next two years.

Recommendations

UMCES should prioritize the use of assessment results for course and program improvement. Further, a plan to assess learning outcomes at the institutional level should be developed once learning outcomes at that level are articulated.

5. How does UMCES align its assessment procedures with those of its academic partners?

UMCES aligns its assessment procedures with its academic partners in several ways, including through its participation in the inter-institutional MEES program, coordination between academic committees of UMCES and partner institutions, and service of UMCES faculty on graduate committees across the USM system (and vice versa).

UMCES strives to align its assessment procedures with its academic partners in various ways. UMCES graduate faculty teach courses and advise graduate students within the MEES program, which is a USM-wide graduate education program (*MEES Website*). Hence assessment procedures are aligned across different campuses as part of the inter-institutional commitment. The inter-institutional structure of MEES requires a single application review process for prospective students. Thus, students who apply to the program are not reviewed by their host institution, but instead by a committee for the MEES program consisting of UMCES and non-UMCES faculty (*MEES Program Committee Members*). Furthermore, several MEES courses are co-taught by UMCES faculty and faculty affiliated with other USM universities and institutions (e.g., *MEES 698T&498T: MEES698T Marine and Enviro Biotech Syllabus*), which allows for cross-institution coordination of course learning outcomes and assessment. Finally, partners in the MEES program accept the grading of faculty teaching MEES courses regardless of their home institution.

Graduate student committees also help UMCES align its assessment procedures with its partners. UMCES faculty serve on graduate committees across the USM, and faculty from other universities in the USM serve on UMCES graduate student committees. It is common for UMCES faculty to serve on the advisory committees of graduate students from UMCP, UMES, FSU, UMBC and UMB. Because of the inter-institutional nature of graduate committees and courses, UMCES continually works to harmonize expectations for graduate student learning with those of its partners.

The unique nature of IMET provides another illustration of the ways in which UMCES works and collaborates with its academic partners regarding assessment. IMET is an institution that is shared among UMCES, UMB and UMBC, which therefore requires frequent alignment of assessment procedures. For example, IMET and UMBC Department of Marine Biotechnology

are actively harmonizing their assessment approaches. As an example, they have cross listed two courses (MEES 698T/498T/ENCE 489 and MBio 478/678 (UMBC) Marine and Environmental Biotechnology), which made it possible to include UMBC undergraduate students in one of the courses taught by UMCES faculty at IMET and share assessment procedures.

The UMCES VPE represents UMCES on the Academic Affairs Advisory Council (AAAC) of the USM and serves on the inter-institutional MEES Administrative Council. Accordingly, the UMCES VPE is well placed to oversee UMCES educational offerings and to ensure they are well integrated within the USM and, in particular, with MEES Program partner institutions. This integration with other campuses can at times slow progress, but it also means that UMCES benefits from (and can also benefit) the experiences of the partner institutions within MEES, as well as the GPILS and FSU programs (*UMCES MSCHE Self-Study 2015*, page vi, page 43, page 49). Finally, UMCES has a faculty representative (Dr. Hali Kilbourne) on the Maryland Higher Education Commission, which periodically considers issues related to learning outcomes.

Recommendations

UMCES should continue to seek opportunities to further align its assessment procedures with those of its partners.

6. How is UMCES's educational effectiveness assessment process itself evaluated and improved? How often are assessment results and procedures reviewed?

UMCES does not currently have a procedure for evaluating and improving its educational effectiveness assessment process. UMCES realizes that the LOA plan being developed and implemented must include a procedure for evaluating and improving its educational effectiveness assessment process.

Following its 2015 MSCHE self-study, UMCES recognized the need to develop a formal and rigorous Learning Outcome Assessment Plan. Toward that end, the UMCES/MEES LOA committee was established in 2019 (Table 5.1) to develop specific, quantifiable research learning outcomes assessment metrics and rubrics, as well as procedures for using assessments to assure progress in ongoing course and program improvement over time (*MEES Learning Outcome Assessment Protocol, May 2020; MEES Graduate Outcomes Assessment Pilot Program Report*). However, procedures for evaluating and improving the assessment process itself are yet to be developed.

Recommendations

As part of the learning outcomes assessment procedures being developed, UMCES should incorporate procedures to evaluate and improve the educational effectiveness assessment process itself, including the frequency and scope of these reviews. UMCES should assess the assessment plan it is implementing in a trial phase for the 2021-2022 academic year at the end of that academic year (i.e. in late spring and summer of 2022).

Covid-19 Impacts

COVID-19 has slowed the progress of the UMCES/MEES LOA committee in developing processes for assessing learning outcomes. In some respects, we do not anticipate large effects on student learning in courses, since UMCES courses have always been conducted using distance learning. Furthermore, since we are still in the midst of COVID-19, it will be difficult to evaluate the impact of the pandemic on learning outcomes until we have moved further beyond the pandemic. However, there has been anecdotal evidence from students that their learning process was slowed and made more difficult by COVID-19. To investigate this, the UMCES/MEES LOA committee will explore comparison of learning outcomes metrics for courses that were offered in spring/fall 2020 relative to learning outcomes in prior or future years for those courses. In addition, some classes that offer field trips and/or hands-on lab exercises had to modify specific learning outcomes in the spring/fall 2020 semesters because of restrictions on in-person meetings and physical distance requirements related to COVID-19. To attempt to overcome this challenge, one course (MEES 680: Cell and Molecular Biology For Environmental Scientists - Genes to Ecosystems) used computer-based learning simulations of lab exercises. Another (MEES 612: Biological Oceanography) used video recordings of field trips from previous years in place of in-person field trips. Certainly, COVID-19 is likely to have impacted student learning that takes place outside of the classroom (e.g. in the field or laboratory).

Connections

WG5s findings concern UMCES's educational goals, assessment of learning outcomes, use of assessments for improvement of learning, and alignment of assessment procedures with partners. As such, WG5s findings relate directly to MSCHE Standard V, which aims to show that the institution's students have accomplished educational goals consistent with their program of study, degree level, the institution's mission, and appropriate expectations for institutions of higher education.

UMCES's mission is to provide a "comprehensive understanding of our environment and natural resources, helping to guide the State and world toward a more sustainable future" (*UMCES Mission Statement Final, 2018*). To help meet that mission, UMCES trains the next generation of environmental scientists through its

research-based graduate program. Training students requires clearly defining what UMCES aims for students to learn in their academic programs, how UMCES determines the extent of student learning, and how UMCES uses information on student learning to revise and refine its programs to further improve student learning. Therefore, WG5s findings will help UMCES better fulfill its mission.

Like other WGs, WG5 also concluded that UMCES needs to more regularly and consistently evaluate its procedures. WG5 also found that UMCES is moving in that direction in a variety of ways, in particular through the MEES LOA committee, which was initiated in UMCES and then expanded to include all of MEES. There is substantial overlap between WG5 and WG3 with regard to the UMCES PCC in particular and its central role in supporting teaching by providing common course templates and guidance documents. The WG3 report focuses on faculty - here we focus more on students and programs.

Conclusions and Recommendations

UMCES generally meets expectations identified by the MSCHE in its Standard V for an accredited institution. Since gaining accreditation, UMCES has made significant strides towards improving assessment of student learning and achievement. In the coming years UMCES is on track to implement fully the plan it has developed to assess and improve student learning outcomes and thus be more effective in carrying out its mission. The overall recommended improvements from WG5 include:

- Make educational goals more easily discoverable
- Better articulate and disseminate institutional-level learning outcomes
- Implement and evaluate trial phase of the program learning outcomes assessment plan in 2021-2022
- Implement a full plan to assess and improve student learning outcomes during the 2021-2022 academic year
- Use assessment results for course and program improvement
- Develop and assess learning outcomes at the institutional level
- Continue to align assessment procedures with partners
- Develop procedures to evaluate and improve the educational effectiveness assessment process itself

Course #	Course Name	PLO 1	PLO 2	PLO 3	PLO 4
MEES680	Cell & Molecular Biology for Environmental Scientists	I			
MEES660	Ecological Systems	I			
MEES620	Environment and Society	I			
MEES640	Interconnected Earth Systems	I			
MEES680R	Applied Bayesian Statistics			R	
MEES609A	Applied Environmental Science		I		
MEES698B	Environmental Statistics I	I		I	
MEES708M	Environmental Statistics II			R	
MEES618D	Ethical Aspects of Environmental Science			I	
MEES607	Quantitative Methods	I		I	
MEES708X	R Programming – part 1 module (basics)			I	
MEES708Y	R Programming – part 2 module (advanced)			R	
MEES608B	Responsible Conduct of Research			I	
MEES708T	Science Visualization			I	
MEES608D	Scientific Writing and Communication			I	I
MEES712	Advanced Population Dynamics and Assessment	R,M		M	
MEES743	Aquatic Toxicology (will have a new name)	R			
MEES621	Biological Oceanography	R			
MEES498I/698I	Chesapeake Bay Health	R			
MEES498Q/608Q	Climate Change Polar Region	R			
MEES663	Ecological Genomics	R		R	
MEES626	Environmental Geochemistry I	R			
MEES627	Environmental Geochemistry II	R			
MEES611	Estuarine Systems Ecology	R			
MEES631	Fish Ecology	R			
MEES682	Fisheries Science and Management	R	R	R	
MEES698X	Global Environment Remote Sensing	R			R
MEES617	Hydrological Efficient Land Use	R	R		
MEES698K	Introduction to GIS			R	
MEES498T/698T	Marine and Environmental Biotechnology	R			
MEES698?	Marine Biophysical Systems	R			
MEES684	Marine Microbial Ecology	R			
MEES618C	Next Generation Sequence and Analysis	R		R	
MEES661	PHYS EST ENV	R			
MEES432/632	Physiological Ecology of Animals	R			
MEES637	Plankton Ecology	R			
MEES698G	Sediment Dynamics in Coastal and Estuarine Environments	R			
MEES614	Spatial and Landscape Ecology in R	R		R,M	
MEES698R	Stable Isotopes in Environmental Research	R		R	
MEES622	Sustainability Science	R	R	R	
MEES608U	Coastal Risk and Resilience	R	R		
MEES698P	Phytoplankton Physiological Ecology	R			
MEES608O	Topics in Omics	R			
MEES708U	Algae, Bioenergy, Biodiversity	R	R		
MEES718W	Classic Readings in Ecology		R,M		
	Seminars	R,M	R		
	ISGs	R,M	R,M		
	Proposal Defense (oral and written)	M			M
	Comprehensive Exams	M			
	Thesis/Dissertation	M	M	M	M

Table 5.3 – Program Learning outcomes in relation to courses in the MEES curriculum. Each course applies to one or more of the four Program Learning Outcomes (PLO 1–4, see Table 5.2). I = Introduction; R = Reinforcement; M = Mastery.

Chapter 6*Planning, Resources, and Institutional Improvement***Purpose**

This chapter on Planning, Resources, and Institutional Improvement addresses MSCHE Standard VI – “The institution’s planning processes, resources, and structures are aligned with each other and are sufficient to fulfill its mission and goals, to continuously assess and improve its programs and services, and to respond effectively to opportunities and challenges.”

Working Group 6 (WG6) set out to answer the following eight questions related to Standard VI and associated Requirements of Affiliation:

1. What are UMCES’s budget allocation processes at the institutional and unit levels? Is budgeting fair, transparent, documented, communicated, and supportive of UMCES’s mission and goals?
2. Do UMCES financial reporting mechanisms and procedures meet best practice standards of the State of Maryland and extramural agencies? How often and by whom is UMCES’s financial performance audited, and how are problems addressed?
3. What are UMCES’s processes for IT, facilities, and infrastructure planning? Is planning fair, transparent, documented, communicated, and supportive of UMCES’s mission and goals? How does UMCES coordinate and align individual unit planning with overall institutional planning?
4. How does UMCES plan for faculty hiring, including areas of expertise, hiring levels, and position allocation between units? Is the process transparent and equitable? How is hiring linked to UMCES mission and goals?
5. How does UMCES plan for hiring of staff and administrative personnel, including position allocation between units? Is the process transparent and equitable? How is hiring linked to UMCES mission and goals?
6. How does UMCES support professional development, advancement, and retention of personnel? How is performance evaluated, and how are evaluation results used for improvement?
7. How and how often does UMCES carry out institutional assessment? Do assessments include the perspectives and concerns of all UMCES employees and students, as well as standard institutional performance metrics?
8. How are institutional assessment results used for strategic planning and institutional improvement?

Scope

Working Group 6 conducted an evidence-based assessment of how well UMCES meets Middle States expectations with respect to Planning, Resources, and Institutional Improvement. WG 6 assessed policies, processes, and procedures used by UMCES to ensure that institutional planning and resources are aligned with strategic initiatives and priorities and are sufficient to support its mission and goals. WG 6 sought to determine whether adequate institutional resources and structures exist within UMCES to provide regular review of programs and services, as well as suggestions for areas

of improvement. The group also reviewed the success of UMCES external communications, examined how and where to improve internal communications, assessed the organizational climate, and determined how the results of the institutional assessment can be utilized to catalyze UMCES’s ability to effectively pursue opportunities and resolve challenges.

Analysis and Problem-Solving Methods

Working Group 6 met three times from late summer 2019 through 2020. The group engaged in brainstorming sessions to develop questions and supporting evidence

to be reviewed for each subject area covered in Standard VI. Notes were taken at meetings and used to develop this report and answer the eight guiding questions.

Results

1. What are UMCES's budget allocation processes at the institutional and unit levels? Is budgeting fair, transparent, documented, communicated, and supportive of UMCES's mission and goals?

The evidence gathered for this report indicates that the UMCES management and budget processes in place are inclusive, transparent, responsive, and regularly reviewed. The budget is typically fair and supportive of UMCES's mission and goals but is limited given the focus on funding of current mandatory operating costs. UMCES receives little funding for new initiatives or programs and needs to pursue external and innovative funding sources to fully achieve future strategic priorities. The UMCES budget model is based on annual State Operating appropriations and restricted and unrestricted funds from grants and contracts. The State appropriation allocation is determined by the Governor and the Maryland General Assembly, based on recommendation of the University System of Maryland Board of Regents (USM BOR). Annual appropriations from the State require constant evaluation and assessment of funded programs in the USM, including UMCES (*UMCES FY2021 Operating Budget*). While overall funding from sponsored projects has remained steady over the past few years, State appropriations have been sharply reduced by 9.5% in fiscal year 2021 and 2022 due to the economic impacts of the COVID-19 pandemic.

The UMCES capital budget is funded by the State of Maryland and requests are approved to move forward to the Governor and General Assembly by the USM BOR. The capital budget process is a long-term funding mechanism that responds to a long-term facilities planning process, discussed below, rather than near-term initiatives. It is not uncommon for a decade to elapse between identification of a building in a capital plan to the commitment of those funds by the state. UMCES recently received approval to begin planning and design of its new Chesapeake Analytics Collaborative Building (CACB) to be located at our Chesapeake Biological Laboratory in Solomons (see Result 3 below).

The State of Maryland Budget Book is made available to the public at the end of the calendar year and represents the Governor's proposed budget to the General Assembly for the following fiscal year. The UMCES budget for FY 2021 can be found in the Budget Book, Volume III, pages 237-241 (*UMCES FY2021 Operating Budget*). State appropriations constitute less than half of direct funding support for UMCES. Actual operating revenues for most years are primarily derived from contracts and grants (Figure 6.1) and other educational and research support

services (*UMCES FY2021 Operating Budget*). After the Maryland General Assembly has approved the annual budget and the Department of Budget Management distributes the appropriation to the USM, the USM

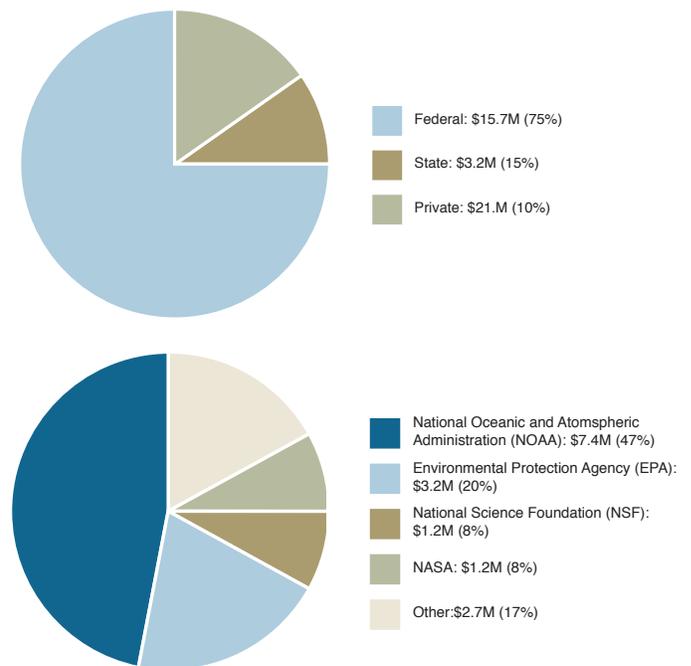


Figure 6.1 – Pie chart graphs of UMCES Funding Sources 2019. Top chart shows sources of all grants, bottom chart shows break down of federal grant funding sources.

distributes the budget to each institution. The UMCES Vice President for Administration, with the Comptroller and Manager of Budget Operations, develops a distribution plan for all Laboratories that is shared and discussed with each Laboratory Director and Associate Director. The budget status of UMCES is reviewed and discussed as needed at either the Executive Council and/or Administrative Council meetings (e.g., *Executive Council Mtg April 15, 2021 minutes*). The Administrative Council includes the members of the Executive Council as well as Laboratory Associate Directors, Administration Program Directors, Graduate Student Council representatives and the Staff Council and Faculty Senate Chairs (See Table 7.1). Agendas and meeting minutes are maintained in the President's office (*Administrative Council Meeting Summary Folder*). UMCES finance/administrative staff routinely conduct projections of actual expenditures and revenues compared to budget and extramural sponsored award analysis over five years. These reports are distributed to Laboratory Directors and Associate Directors.

The MEES program is the principal educational program within UMCES. All MEES courses are listed as UMCP courses, whether they are taught by UMCES faculty or UMCP faculty. Through a memorandum of understanding, updated most recently in 2012 (*MOUs between UMCP and UMCES*), UMCES receives 85% tuition return from UMD for course and research credits taught by UMCES faculty in the MEES program. These funds are used to

enhance the UMCES graduate education programs. 25% of the funds returned to UMCES are allocated to support the Office of the Vice President for Education and the remaining 75% are allocated to the Laboratory responsible for delivering the courses based on course credits taught. A ten-year chart of tuition income, showing steady increases, is shown below (Figure 6.2).

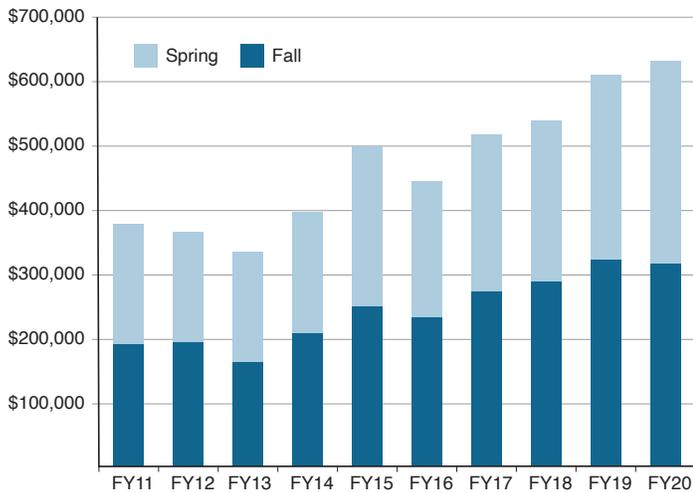


Figure 6.2 – MEES Tuition Revenue from FY11 through FY20

Recommendations

UMCES should continue to conduct its budgeting and resource allocations in an open, participatory, and transparent process. In light of recent budget cuts to USM and UMCES State appropriations, as well as limited State funding for new initiatives, UMCES should develop a funding model plan over the next two years that relies less on State Appropriation revenues and more on growing other revenue streams. These revenue streams might include larger “team science” research programs, enhanced fee for specialized service arrangements (e.g., graduate certificate courses), targeted donor development opportunities, education and/or diversity grants, increased international partnerships, etc.

2. Do UMCES financial reporting mechanisms and procedures meet best practice standards of the State of Maryland and extramural agencies? How often and by whom is UMCES’s financial performance audited, and how are problems addressed?

UMCES has an excellent track record in required financial reporting and internal controls. UMCES, as an institution within the USM and agency in the State of Maryland, meets all financial reporting policies and procedures as required by the State, the BOR, and all federal, state, and private sponsors. UMCES is held to the criteria established by the Governmental Accounting Standards Board (GASB) for annual financial reporting

and Generally Accepted Accounting Principles (GAAP) in the format presentation of financial statements and related Single Audit (A-133) reports. UMCES financial reporting and internal controls are audited annually by the State of Maryland independent audit firm. The State of Maryland Office of Legislative Audit (OLA) performs a full financial and internal control audit of UMCES every three years. Various operational and financial audits are conducted annually by the USM Internal Audit Office, including financial, IT, emergency planning and safety audits, as well as follow-up reviews to determine that any recommendations from them or any external audit office have been properly implemented. UMCES has not historically received audit requests from extramural sponsoring agencies, which is a sign of the excellent internal controls and financial reporting mechanisms in place at the institution. UMCES generally receives limited comments and/or recommendations from the auditors. Any comments or recommendations received are immediately addressed by the Vice President for Administration, with the Comptroller’s and Associate Laboratory Directors’ assistance, in verbal conversation with the auditors as well as in formal written response to an audit report.

The FY 2019 USM and UMCES audited financial statements and Single audit report presented no specific findings for UMCES (*State of MD FY19 Single Audit Together with Reports of Independent Public Accountants*). The most recent Legislative Audit report presented only minor documentation recommendations related to contract and grant collection processes (*UMCES Legislative Audit 19*). The most recent USM Internal audits of UMCES regarding Purchasing Card management reported no findings and the USM follow-up audit on UMCES Emergency Preparedness Planning reported only minor recommendations to implement training activities, which could not be done during the Covid pandemic timeframe, as soon as there is a full return to normal campus operations. (*UMCES P Card Report October 2020 Thru December 2020, UMCES - OIA Response - CBL Emergency Preparedness Follow-up - 4.13.21, UMCES - OIA Response - AL Emergency Preparedness Follow-up - 4.13.21, and UMCES - OIA Response - HPL Emergency Preparedness Follow-up - 4.13.21*).

Recommendations

There is no further recommendation for improvement.

3. What are UMCES's processes for IT, facilities, and infrastructure planning? Is planning fair, transparent, documented, communicated, and supportive of UMCES's mission and goals? How does UMCES coordinate and align individual unit planning with overall institutional planning?

UMCES operates world-class research facilities at its four locations across the State that support its research mission in marine and environmental science as well as its role in the State around Chesapeake Bay restoration efforts. Laboratory facilities and instrumentation are distributed according to the focus of each location. They include specially designed laboratories with advanced instrumentation and seawater systems for maintenance



Figure 6.3 – R/V Rachel Carson

of and experimentation with aquatic and terrestrial organisms. Instrumentation is used to undertake complex chemistry and biology experiments and analyses, including DNA sequencing and advanced molecular and isotopic measurements. UMCES is home to extensive shellfish and finfish aquaculture facilities including the largest oyster hatchery operation on the east coast. The 81-foot R/V Rachel Carson, a state-of-the-art research vessel, is also owned, operated and maintained by UMCES (Figure 6.3).

Planning for IT and Facilities investments is done through advisory committees with recommendations to the EC and VPA. Priority is considered based on a combination of Laboratory specific initiatives as well as potential major capital infrastructure upgrades. The UMCES Facilities Advisory Committee, made up of the Laboratory Associate Directors and the UMCES Facilities Director (position open at the present time) meet regularly to prioritize facilities renewal projects. (*UMCES Facilities Advisory Committee Charge*). The UMCES Cyber-Infrastructure (CI) Committee plans and prioritizes institutional technology infrastructure enhancements and upgrades and makes recommendations to the EC. The CI Committee is made up of representatives from faculty and staff from each Laboratory and the UMCES CIO. (*Cyberinfrastructure Committee Charge*).

The UMCES Five Year Facilities Master Plan Update for FY 2018-FY2022 presented to and approved by the USM BOR details plans and resource allocations to ensure

that it has the critical facilities to achieve its mission. (*UMCES Facilities Master Plan Update - 2018*). The USM BOR capital budget plan for the next five years includes funding for continued construction and growth of UMCES, specifically with the new construction of the Chesapeake Analytics Collaborative Building (*Comparison of BOR vs GOV CIP FY2022-2026 USM CIP Rev 1-20-21 and USM-Pages State CIP 1-20-21*). This capital project will help foster collaboration that is critical to cross-disciplinary research and training. The facility will provide UMCES the ability to enhance and grow research collaboration with State, federal, NGO's and the private sector by providing an IT data visualization facility to effectively analyze the complex data sets for Chesapeake Bay restoration and other Maryland environmental issues. It is guided by overall sustainable designs, continued development and expansion of IT infrastructure and is expected to enhance public outreach and educational programs through improved collaborative space.

UMCES maintains a healthy facilities renewal budget to upgrade existing facilities and infrastructure in accordance with USM BOR priorities and policies (*USM VIII-10.10 Policy on Facilities Renewal for Auxiliary and Non-Auxiliary Capital Assets and UMCES Policy VIII-10.10 Facilities Renewal Program*). Decisions on the allocation of these funds are made by the UMCES Facilities Advisory Committee. These renewal projects typically contribute to reduced energy use and are planned with design approaches that may include re-purposing of spaces to extend the useful life of existing materials and reduce overall greenhouse gas emissions. Unfortunately, the recent FY 21 and FY 22 budget combined cut of 9.5% has reduced facilities renewal funding by over half of the \$1.6M annual budget amount.

Recommendations

UMCES should continue its planning and allocation processes that are fair, transparent and representative of institutional and Laboratory mission and priorities. In light of the magnitude of recent budget cuts, UMCES leadership should develop a plan to restore the funding of facilities renewal to its full level by FY 2023.

4. How does UMCES plan for faculty hiring, including areas of expertise, hiring levels, and position allocation between units? Is the process transparent and equitable? How is hiring linked to UMCES mission and goals?

The faculty hiring and recruitment model in place at UMCES is transparent, inclusive of campus community feedback and works well for UMCES in support of its research and education missions. Faculty hiring and recruitment are guided by the UMCES Strategic Initiatives Plan (*UMCES Strategic Initiatives, 2019*). Faculty searches and recruitment are initiated at each

Laboratory as positions open or are vacated. Position allocations are budgeted at the various Laboratory units. Position descriptions and search plans are initiated by the Laboratory Director and faculty during faculty meetings and approved by the President. UMCES has a low faculty turnover rate; even the retirement of 10 senior faculty and resignation of 2 junior faculty over the past 5 years noted in the introduction (unusually large turnover for UMCES) amounts to only 3% per year turnover. Thus, faculty searches are considered critical to mission.

Faculty positions are advertised both nationally and internationally. A search Committee that includes faculty representatives from at least two UMCES Laboratories evaluates candidates and develops a short list of candidates for further consideration (UMCES Policy II-1.00 Appointment, Promotion, and Tenure of Faculty). Shortlisted candidates are invited to give seminars in their area of expertise to UMCES faculty and students as part of the process. Interviews typically occur over two days and provide opportunities for UMCES faculty, staff and students to meet with candidates. Following a faculty discussion at the laboratory at which the hire will be based, the Laboratory Director provides the President with a list of acceptable and unacceptable candidates. The President makes the final decision regarding faculty hires. Salary and start-up negotiations then proceed between the selected candidate and the Laboratory Director to whom the candidate will report.

Recommendations

There are no further recommendations around these processes.

5. How does UMCES plan for hiring of staff and administrative personnel, including position allocation between units? Is the process transparent and equitable? How is hiring linked to UMCES mission and goals?

The Staff hiring and recruitment model in place at UMCES is transparent and works well for the institution in support of its mission. Recruitment of key Administrators and staff is guided and handled much like that of Faculty. Searches are initiated at each Laboratory as positions open or become vacant. Position allocations are budgeted at the various Laboratory units. Position descriptions and search plans are initiated by the Laboratory Director with input from faculty and staff. Position descriptions and search plans are submitted to Human Resources for approval and posting.

Unlike faculty positions, most staff positions are advertised nationally or locally. Search Committees often include representatives from each Laboratory and for key high-level Administrator roles may include meetings

with the members of the EC and Administrative Council (*UMCES Policy VII.1.01 Recruitment and Selection of Non-Faculty*). Approval of the UMCES President is not required for staff hires, in general.

Recommendations

There are no further recommendations around these processes.

6. How does UMCES support professional development, advancement, and retention of personnel? How is performance evaluated, and how are evaluation results used for improvement?

UMCES provides a wide range of opportunities for professional development to all faculty, staff, and students as requested and needed for advancement. UMCES values additional training and education to develop and retain all personnel. Each Laboratory and the Center Administration commit budgeted funding for this purpose. UMCES has a defined Performance Management Program in place for staff performance assessment which is carried out annually. UMCES continues to strengthen faculty review procedures that are also conducted annually.

Examples of support for professional development include encouraging staff participation on the USM Council of University System Staff (CUSS), participation in the USM Council of University System Faculty (CUSF), leadership and participation in the USM Women's Forum, various external training seminars and webinars through professional organizations such as NCURA, AICPA, and SAIGlobal to name a few. UMCES also provides training and certification opportunities for Bargaining Unit staff in compliance with our Collective Bargaining Agreement (*UMCES-MCEA Collective Bargaining MOU*).

Laboratory Directors and supervisors carry out staff performance evaluations on an annual basis using the Performance Management Program requirement as defined in UMCES policies (*UMCES Policy VII.5.20 Performance Evaluation Program*). All faculty members also undergo a regular annual review. Junior faculty members at all ranks undergo a comprehensive and inclusive review for promotion three years after appointment. Additionally, there are periodic five-year comprehensive post-tenure reviews of Associate and Full Professors. (*UMCES Policy II.1.00 Appointment, Promotion, and Tenure of Faculty*). Results of annual reviews are discussed with employees and plans for needed enhancements or training are put in writing as part of the evaluation document.

UMCES was an early adopter within the University System of a 5-year post-tenure review process. These reviews are completed by a single committee, appointed annually by the UMCES President, that reviews all candidates who have not been reviewed in the previous five years. Initially,

faculty receiving excellent or superior ratings in the five-year period were exempted from review. However, that procedure was abandoned as it created a “shifting baseline” challenge because data from top-performing faculty were not available to the review committee. Now, the review committee prepares a review for each individual faculty member, which is incorporated into the faculty member’s annual review. The review committee also provides an overall summary for the President.

Evaluation of faculty members is weighted heavily towards research and education using a Discovery, Integration, Application, and Education framework for performance reviews. Each Laboratory has a slightly different approach to faculty performance evaluation documentation. The Faculty Senate is currently engaged in working to expand the faculty annual review framework to include other responsibilities, such as Public Service, as a weighting factor and to standardize faculty performance documentation and expectations across UMCES.

Recommendations

The Faculty Senate, Laboratory Directors, and President should continue their efforts to revise the faculty evaluation framework to more comprehensively align performance expectations and evaluation procedures, with a target to begin implementation in calendar year 2022.

7. How and how often does UMCES carry out institutional assessment? Do assessments include the perspectives and concerns of all UMCES employees and students, as well as standard institutional performance metrics?

Effective assessment procedures and policies for all USM institutions are in place. They broadly guide and benchmark traditional higher education standards that each institution, including UMCES, must meet. Most of these are reported annually and reviewed by the Legislature and BOR. Examples of annual data assessments include the USM Managing for Results Report (*Managing for Results Report - UMCES*), the USM Annual Report on Cultural Diversity (*UMCES - USM Cultural Diversity Report 2021 - Full Report*), the Dashboard Indicators Report (*USM Dashboard Indicators - UMCES*), USM Shared Governance Surveys (*UMCES USM Staff Survey 2020 and USM 2020 Staff Report*), and the annual Effectiveness and Efficiency Report (*UMCES Efficiency Efforts report FY2020 10272020*). Further, UMCES is a participant in the annual NSF Survey on Higher Education Research and Development (*Annual NSF Higher Education Research and Development Report FY2017-2019*). These reporting tools are broadly disseminated through the USM.

Responding to a recommendation from UMCES 2015 Accreditation Evaluation Team, UMCES leadership

recognized the need for a more robust Institutional Assessment process which was implemented and documented in 2018 (*UMCES Institutional Assessment, 2018*). The Institutional Assessment process was modeled after the socio-environmental report card process that the UMCES Integration and Application Network has pioneered in Chesapeake Bay and applied to locations around the world. This five step process was the following: 1) establish values and aspirations, 2) choose indicators, 3) determine metrics, 4) calculate scores, and 5) communicate results. The process engaged the entire UMCES community, including faculty, students, research staff and administrative staff.

Visits to each UMCES unit (Appalachian Laboratory, Chesapeake Biological Laboratory, Horn Point Laboratory, Institute of Marine Environmental Technology, Integration and Application Network, Maryland SeaGrant and Center Administration) with “all-hands” meetings were made by the VP Science Application and IAN Science Communicators to solicit input. The objective of the unit visits was to determine what UMCES employees value about working for UMCES as well as potential indicators to measure whether UMCES is successful in attaining its mission. IAN staff facilitated an interactive activity in which participants provided input to the questions “What do you value about working at UMCES?” and “What should UMCES aspire to in five years?”

Unit visits were followed by an anonymous survey to all UMCES employees. External evaluators from the *College of Exploration* participated in the initial site visit, reviewed the survey questions and administered the survey. The site visits and survey results were brought to the UMCES assessment team, comprised of representative faculty, staff, and students and the assessment team formed the UMCES institutional assessment framework, which included the following indicators: institutional goals (discovery and integration, service and application, mission), operational effectiveness (facilities, financial viability, governance and leadership), and education (student learning, student services, student progression). Each indicator was composed of two to five metrics that were averaged into one score.

Results of the institutional assessment (Figure 6.4) were brought back to the UMCES community with a series of presentations which allowed opportunities for feedback. The Institutional Assessment Team also presented results to the UMCES Administrative Council and received constructive criticisms on how the process could be enhanced when it is repeated. UMCES is committed to ongoing Institutional Assessments.

UMCES plans to repeat the Institutional Assessment in the spring of 2022. The COVID-19 pandemic impacted the original plan to repeat the Institutional Assessment in FY 2020. We note that the Institutional Assessment has yet to be integrated into Institutional decision making in a fashion similar to the assessment cycle for educational programs. This is a natural next step for the Institutional Assessment. UMCES recognizes that we will discover the

strengths and weaknesses of the Institutional Assessment most efficiently when we try to use results of the assessment regularly in decision making.

Recommendations

UMCES is committed to deploying its Institutional Assessment Report Card tool on a regular cycle. This will

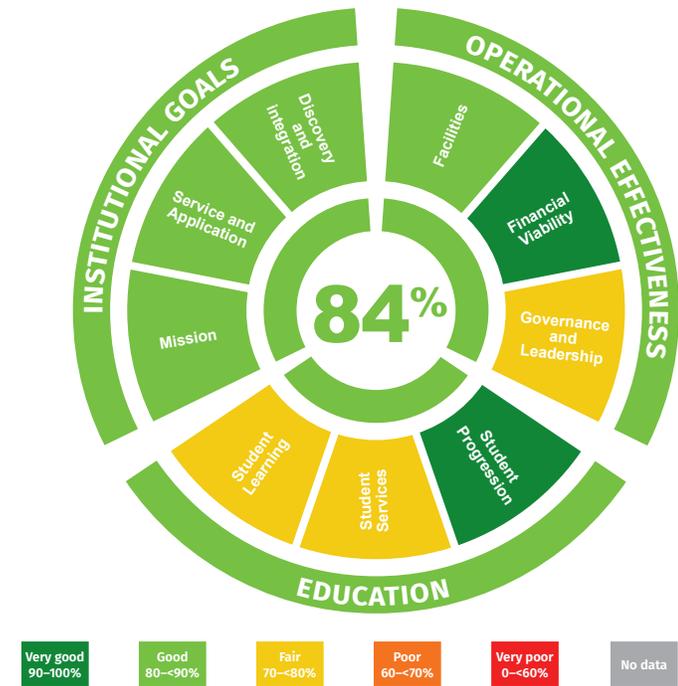


Figure 6.4 – Graphical Summary of the 2018 UMces Institutional Assessment Report Card.

provide UMces important benchmarking on a range of institutional goals. However, we recommend that UMces should develop additional targeted assessment tools, deployed separately, that focus on specific areas of interest. An example of this approach is the planned 2021 Cultural Climate Assessment (see below). UMces should commit to using and regularly evaluating the information content of its various assessment tools to provide a cycle of continuous improvement.

8. How are institutional assessment results used for strategic planning and institutional improvement?

UMces’s most recent *Strategic Initiatives Plan* was implemented in 2019. The 2018 Institutional Assessment process informed key strategies and visions in that plan from the study framework. Two areas that were found to need attention were work/life balance and diversity, equity and inclusion as well as the need for enhanced Student Services.

Many of the assessments described above are conducted in the spirit of shared governance common to UMces. In these instances, internal and external assessments

and strategic planning are conducted collaboratively by faculty and administration through discussion and presentation at the EC and Administrative Council meetings (*Executive Council Meeting Minutes Repository* and *Administrative Council Meeting Summary Folder*).

UMces has worked to address diversity, equity, and inclusivity as an institutional strategic priority which culminated in the development of the UMces Diversity, Equity, and Inclusion Collaborative (*UMces DEIC Charter, September 2020*). This Collaborative group includes faculty, staff, and students and is co-chaired by the VP for Education and a senior administrative staff representative, currently the Director of the Office of Research Administration and Advancement (ORAA). The group has recently brought forward the need for a Campus Climate Survey, which is being addressed as priority implementation over the next few months. Another area that the Institutional Assessment indicated was lacking was a more robust, centralized student service function.

Recommendations

UMces should continue to perform the various assessments noted above and incorporate results and recommendations into the Institutional decision making and prioritization processes.

COVID-19 Impacts

UMces extramural sponsored awards and proposals remained steady throughout the pandemic. This level of productivity speaks highly of the talent and resourcefulness of our faculty and staff. Our faculty expertise is held in high regard by our partner federal, state, and private sponsors who continue to look to our faculty for research engagement. Our faculty found innovative ways to continue their work even when we were ordered to close our State facilities down to only essential personnel. As we begin to look at re-opening and normal operations, UMces faculty and staff are energized to return to their offices and laboratories.

Perhaps the biggest impact to UMces as a result of the COVID-19 pandemic has been the State of Maryland cut to the USM budget which resulted in a 9.5% reduction to the UMces State appropriation funding totaling slightly over \$2M per year in FY2021 and FY2022. This cut has resulted in a \$800K cut to facilities renewal funding and more than \$1.2M in other operating budget cuts across the institution. We have implemented a “hard” hiring freeze with approval by the President. We also implemented a temporary salary reduction plan in FY 21 for our highest paid staff and faculty. As UMces cannot raise tuition, room or board rates to offset this cut in coming years, it has real and lasting impacts to our base operating budget that will require us to look closely at our financial model over the next two years

and to pursue additional opportunities to partner with our USM “sister” institutions around our business and administrative processes. This new financial model should include restoration of facilities renewal funding temporarily reduced to meet the exigencies of state funding cuts. UMCES has received assurances from the highest levels of the University System of Maryland that its unique financial constraints are understood and that the USM will work to help restore the lost facilities renewal funds and ensure UMCES long-term financial viability.

Connections

Planning, Resources, and Institutional Improvement affect all aspects of UMCES functioning, but particularly its ability to meet its institutional mission and goals (Chapter 1), to support delivery of high quality graduate education (Chapter 3), and to support its faculty, students, and staff (Chapter 4). In turn, planning, resources, and institutional improvement must be informed by UMCES commitment to ethics and integrity (Chapter 2), and are carried out within the context of UMCES governance, leadership, and administration (Chapter 7).

Conclusions and Recommendations

The Working Group’s findings and recommendations indicate a high level of compliance exhibited by UMCES. However, limited institutional funding resources must be addressed to grow the institution and provide a higher level of faculty, staff and student support. Overall, UMCES succeeds in supporting its mission, personnel, and students through effective resource allocation methodologies and assessments. UMCES has developed an institutional culture that values Institutional Assessment and its contributions to continued excellence and service.

The Working Group recommended that implementation of a new financial model would help to grow the institution in line with its Strategic Initiatives plan and develop new revenue opportunities that are not currently being pursued. A new financial model should include a focus on enhanced student service functions and the restoration of facilities renewal funding. The Faculty Senate efforts to enhance and standardize faculty performance plans should continue to be a priority.

Chapter 7

Governance, Leadership, and Administration

Purpose

Working Group VII addressed MSCHE Standard VII, which states “The institution is governed and administered in a manner that allows it to realize its stated mission and goals in a way that effectively benefits the institution, its students, and the other constituencies it serves. Even when supported by or affiliated with governmental, corporate, religious, educational system, or other unaccredited organizations, the institution has education as its primary purpose, and it operates as an academic institution with appropriate autonomy.” The Working Group specifically addressed the following questions:

1. How does UMCES’s governance structure support its mission, goals and responsibilities?
2. Are appropriate roles, responsibilities, and decision-making abilities assigned to each of UMCES’s shared governance bodies, and are these understood and accepted by the UMCES community?
3. What formal and informal mechanisms are in place at UMCES for information sharing between administration, faculty, students, and staff?
4. Are the roles and authorities of the UMCES Administration, the University System of Maryland (USM) Administration, and the USM Board of Regents (BOR) sufficiently well-defined to ensure necessary institutional independence within the context of appropriate System oversight?
5. Are UMCES policies and procedures well-established, organized, accessible, and clearly articulated?
6. Is there sufficient administrative support to meet UMCES’s institutional responsibilities without overly burdening the faculty?
7. What procedures are followed for reviewing the effectiveness of the President, Vice Presidents, and Laboratory Directors?
8. Are mechanisms in place to allow UMCES governance, leadership, and administration to adapt to changing needs, concerns, and mandates?

Scope

Working Group VII evaluated the effectiveness of shared governance, leadership, and administration at UMCES using a variety of evidence. This evidence consisted primarily of policies and procedures of the different representative governance groups, UMCES strategic initiatives, and BOR policies and minutes. Primary data sources for relevant policies included:

1. *UMCES Policy I.6.00 on Shared Governance:* This policy identifies mechanisms through which staff, faculty, and students can participate with the administration in shared governance.
2. *UMCES Policy I.6.00.1 on Organization of UMCES:* This policy defines governance structures, including the administration and the Faculty Senate.

3. *USM Policy VII.01 Multi-Year Review of USM Presidents:* This policy presents the procedures for reviews of all USM presidents, including the UMCES president.
4. *UMCES Policy VII.5.02 Review of Laboratory Directors and UMCES Policy VII.5.20 Performance Evaluation Program:* These UMCES policies present the procedures for reviews of Laboratory Directors and other UMCES employees, respectively.

Analysis and Problem-Solving Methods

Working Group VII has been meeting on a quarterly basis since January 2020. Each meeting focused on establishing and responding to questions that addressed the scope of Working Group VII. Prior to each meeting members of Working Group VII read and evaluated

potential sources of evidence and took detailed notes in a shared Google Document about if/how that piece of evidence addressed the question. During its quarterly meetings the members of Working Group VII discussed the questions, responses and relevant evidence, potential deficiencies, and recommendations.

Results

1. How does UMCES’s governance structure support its mission, goals, and responsibilities?

UMCES policies and the UMCES organizational chart (see Figure I.2) demonstrate the depth of professional leadership at the core of UMCES. UMCES’s administrative structure and leadership, together with active shared governance policies and practices, indicate that UMCES’s governance structure supports its mission, goals, and responsibilities.

UMCES is one of 12 member universities of the USM. The USM and its BOR constitute a mature higher educational structure with clear governance guidelines and ethical standards as evidenced by the accreditation status of all 12 institutions of the USM from the MSCHE, as well as accreditation by other bodies (e.g., medical school accreditation). The BOR is an independent body, whose members are appointed by the Governor of Maryland and the General Assembly (2 members) with review and consent of the Maryland State Senate (Figure I.2). The BOR develops, reviews, and approves policies that are adhered to by all USM institutions (*USM Board of Regents By-Laws*). The Chancellor of the USM is appointed by the BOR. Individual institutional policies must not be in conflict with BOR policies.

The President of UMCES reports to the Chancellor of the USM. The UMCES President is a leader with qualifications that serve UMCES effectively within the University System and as a representative of UMCES to the national science, education, and policy communities. UMCES President Goodwin also serves as the USM Vice Chancellor for Environmental Sustainability (2017-present), as did his predecessor since 2008. In recognition of the important role that UMCES plays in the environmental affairs of the state of Maryland, the UMCES President is specifically included as a member of the Governor’s Council on the Chesapeake Bay (a subcabinet maintained under the past seven governors, by Executive Order), Coast Smart Council (by statute), and the Maryland Commission on Climate Change (by statute).

Shared governance is practiced within the USM and UMCES and is inclusive of faculty, staff, and students. For example, within UMCES the faculty is represented by the long-standing Faculty Senate (FS) (*UMCES Policy II-3.00 Faculty Senat*), staff by the Staff Council (SC) (*UMCES Staff Council Policy and Procedures I 6.00.3*), students by the Graduate Student Council (GSC) (*UMCES Policy III-7.11 Graduate Assistantships*), and the

educational interests of faculty by the Graduate Faculty Council (GFC) (*UMCES Policy and Procedures III-7.10 Graduate Education*). The FS and the three Councils have representation on the UMCES Administrative Council (AC) (*UMCES Policy I-6.00.1 Organization of UMCES and Table 7.1*).

The various UMCES shared governance councils interact regularly with the Administration to support the UMCES mission and goals, participating actively in the UMCES AC (Table 7.1) and working on their own as well. The FS is the primary faculty vehicle to represent faculty interests in institutional support for research and professional advancement (*UMCES Policy II-3.00 Faculty Senate*) and the GFC represents the education/instruction interests of faculty in support of UMCES education programs (*UMCES Policy and Procedures III-7.10 Graduate Education*). The SC represents the needs and concerns of UMCES staff and contributes through identification and resolution of operational issues. The GSC actively represents the needs and concerns of the student body and has promoted institutional support for improvements in diversity, equity and inclusion, work climate, and employee health.

Each year all USM institutions’ shared governance councils complete shared governance surveys. The survey results are considered by the Chancellor in the President’s annual review and 5-year review, but to date have not been shared beyond the President’s office. This year, when the results are finalized, the UMCES President plans to meet with the AC to discuss the findings and ways to make improvements to governance structure and communications throughout the institution.

UMCES does not have a traditional institutional research

UMCES Administrative and Executive Council Membership

President*
VP for Administration*
VP for Science Application*
VP for Education*
Unit Directors (5)*
Chief of Staff*
Associate Unit Directors
Director of Human Resources
Director of Research Administration
Director of Communications
Comptroller
Chief Information Officer
Director of STEM Engagement
Faculty Senate Chair
Staff Council Chair
Graduate Student Council Chair
<i>*denotes Executive Council members</i>

Table 7.1 – UMCES Administrative and Executive Council Membership

office and likely never will. Data collection and analysis are spread amongst several offices including Vice President for Administration (VPA), Vice President for Education (VPE), Human Resources (HR), Office of Research Administration and Advancement (ORAA), and the Chief of Staff. This arrangement, while workable, does result in occasional duplication of effort and/or confusion.

Recommendations

The different offices responsible for institutional data collection and analysis should meet 1-2 times per year to discuss the types of data they collect, analyze, develop, and maintain to ensure that they are using common data sources and drawing similar conclusions. This may also lead to consolidation of data collection and maintenance.

UMCES's AC should receive and review a summary of the shared governance survey results, edited as necessary to protect privacy and confidentiality, to garner insights into how UMCES can better interact and engage in shared governance.

2. Are appropriate roles, responsibilities, and decision-making abilities assigned to each of UMCES's shared governance bodies, and are these understood and accepted by the UMCES community?

The USM requires its institutions to have well defined shared governance policies in which all members of the campus community have representation. UMCES has a shared governance policy and organizational structure approved by the BOR (*USM Board of Regents By-Laws* and *USM Policy I-6.00 Shared Governance in the University of Maryland System*). UMCES shared governance bodies (Faculty, Staff, and Students) have representatives serving on various decision-making bodies. These shared governance bodies meet frequently within their own groups and provide reports to the AC and other bodies where and when appropriate. They also provide guidance on UMCES administrative matters through the appropriate administrative channels.

At the administrative level (*UMCES Policy I-6.00.1 Organization of UMCES*), the UMCES AC, chaired at alternate meetings by the Chief of Staff and the VPA, is a broadly representative body (Table 7.1) that meets every 2 months. The AC is charged with reviewing new policies and procedures and bringing its recommendations forward to the President. Once policies are approved by the President, they are submitted to the USM and BOR to ensure they meet expected goals and standards.

The Executive Council (EC) is a subset of the AC consisting of the President (Chair), Chief of Staff, four Vice Presidents, four Laboratory Directors, and the Director of Sea Grant (Figure I.2). The EC meets in executive session every 2 months, alternating with AC meetings, and occasionally for special purposes at the discretion of the

President.

UMCES has an active FS that is elected by the faculty. The FS includes representation from all faculty tracks, graduate research assistants, and faculty research assistants. FS members are elected by vote of faculty members within each UMCES Laboratory for three-year terms. The Chair of the FS must be a tenured faculty member and is elected at large by the UMCES faculty. The Vice Chair, who must be a tenured faculty member, and Secretary of the FS are elected annually by members of the FS. The Chair of the FS is a regular member of the AC (Table 7.1). The primary roles of the FS are to develop and review policy changes, to represent the interests of the faculty to the administration, and to plan the annual UMCES Faculty Convocation (UMCES Policy II-3.00 Faculty Senate). Additionally, the chair and vice chair of the FS serve as representatives of UMCES on the USM Council of University System Faculty (CUSF).

The Graduate Faculty Council (GFC) was reconstituted in 2013 (*UMCES Policy and Procedures III-7.10 Graduate Education*). The UMCES GFC acts on behalf of the UMCES Graduate Faculty in the development and facilitation of all policies and procedures relating to graduate education. It is an active body that participates regularly in the shared governance of UMCES and is chaired by the VPE. Graduate students are represented on the GFC by two representatives of the UMCES Graduate Student Council (GSC), generally the GSC chair and co-chair. The chair of the UMCES FS is an ex officio member of the GFC.

The GSC consists of two students from each UMCES Laboratory (*UMCES Policy III-7.11 Graduate Assistantships*). The Chair of the GSC is a full member of the UMCES AC. The Chair and Vice-Chair of the UMCES GSC serve as members, with voting privileges, on the UMCES GFC. All GFC subcommittees, including those related to programs, curricula, and courses and learning outcomes, include a student representative. A representative of the UMCES GSC serves on the FS but does not have voting privileges. Additionally, regular faculty meetings at each Laboratory include a graduate student representative. Furthermore, the GSC has two representatives of the University System of Maryland Student Council (USMSC), which includes all twelve USM institutions, three regional centers, and the USM System Office (*USMSC By-Laws*). This body meets monthly to discuss issues that are important to both undergraduate and graduate students throughout the system. Issues can be raised and discussed and are heard directly by the Senior and Assistant Vice Chancellors for Academic and Student Affairs of the USM who attend all meetings.

The Chair of the UMCES Staff Council (SC) is elected by members of the exempt and non-exempt staff. Each Laboratory has at least one staff member serving as its representative (*UMCES Staff Council Policy and Procedures I.6.00.3*). The Chair of the SC participates as a member of the AC and regularly reports to the SC on relevant issues. In addition, the UMCES SC meets

annually with the UMCES President to discuss relevant issues. Furthermore, the SC has four representatives on the Council for University System Staff (CUSS), which includes staff representatives from all twelve USM institutions as well as the USM System Office (*CUSS By-Laws*). This body meets monthly to discuss issues that are important to all staff members and is able to raise and discuss issues through annual meetings with the Chancellor and a member of the BOR.

The Diversity, Equity, and Inclusion Collaborative (DEIC) was formed in 2020 and is chaired by the VPE (*DEIC Charge from President*). UMCES is committed to being in the vanguard of efforts to make geosciences and our institution's community more diverse, equitable, and inclusive. Our commitment will involve conscious actions to attract, recruit and retain staff, faculty, and students from underrepresented minorities in geosciences. The entire UMCES community is invited to DEIC monthly meetings, but meetings tend to alternate between a core group and the full community. The DEIC reports out at all shared government council meetings.

Recommendations

UMCES should facilitate an annual joint meeting of the governance bodies (Faculty, Staff, Students, Graduate Faculty, DEIC) so they can present their short- and long-term goals to each other. This would assist in coordinating efforts to achieve mutual goals and develop strategies to assist the entire community in meeting these objectives.

The GSC is described in *UMCES Policy III-7.11 Graduate Assistantships*, and recently has developed a set of policies and procedures (*UMCES Graduate Student Council*) to define their governance role. Formal consideration and approval of these policies by the Administration would further formalize the role of the GSC in UMCES's shared governance.

As stated in *UMCES Policy I-6.00.1 Organization of UMCES*, the President may invite individuals to join the AC. However, there is currently no formal document stating that the shared governance councils will have standing representation on the AC. Membership of the shared governance councils on the AC should be formalized.

3. What formal and informal mechanisms are in place at UMCES for information sharing between administration, faculty, students, and staff?

UMCES has defined and regularly exercised formal and informal mechanisms to ensure information sharing between administration, faculty, students, and staff. UMCES AC and EC membership includes representatives of all administrative programs and the leadership of all UMCES units. Because of this broad representation, and because members of the AC also represent UMCES

on various USM committees and councils (see Table 7.2 below), the AC serves as an effective conduit for information sharing both up and down the USM and UMCES.

Laboratory Directors have substantial management and budget responsibility. The Directors serve as conduits of information between their Laboratory community's concerns and goals and the UMCES Central Administration. Lab Directors also hold regular meetings with faculty, research assistant and student groups and have open door policies in which anyone can ask to have specific concerns addressed. Topics of meetings include institutional budgets, salary and benefit changes, fiscal and facilities planning and priorities, new hires, new research and equipment initiatives and, importantly, celebration of individual staff, student, and faculty achievements. Directors are well informed and in touch with the faculty, students, and staff at their Laboratory and, as a result, they are the most efficient mode for conveyance of information and assurance of transparency across the broader UMCES community.

Information sharing occurs within the shared governance bodies at their separate meetings, AC meetings, and the annual Faculty Convocation. The President regularly issues various statements and updates and occasionally holds "All-Hands" and sector meetings (Faculty, Staff, or Students) depending upon the topic. UMCES also publishes a monthly internal newsletter that highlights various accomplishments and newsworthy items (*Inside UMCES - August 2020*). Finally, all UMCES units publish and distribute informative newsletters (e.g., *HPL Brief and Interesting, July 2021, CBL E-Newsletter, August 2020*).

From an academic perspective, each Laboratory hosts seminars by UMCES faculty and students as well as external visitors. These seminars are open to everyone, currently held virtually, and advertised internally. Several times a year, each laboratory hosts seminars for the broader public that are either provided by faculty or visiting scientists (e.g. CBL Science for Citizens Seminars and AL Watershed Moments). These seminars are important mechanisms to ensure information sharing, both internally and externally.

The UMCES SC meets every two months to discuss issues that are relevant to all staff members (*UMCES Staff Council Policy and Procedures I 6.00.3*). The SC maintains a website that describes the roles of SC members, the names of unit representatives, a record of past meeting agendas, and a form where staff members can raise questions or concerns anonymously (*UMCES Staff Council Website*). This ensures that staff members have the ability to raise issues either directly with unit representatives or anonymously to staff council members. There is also an annual open meeting where all staff can meet with members of staff council to discuss any issues or priorities and an annual Staff Appreciation Day, where staff from all UMCES units gather for an informal celebration.

The UMCES GSC meets monthly to discuss issues that are relevant to graduate students at the four labs, IAN, and Maryland Sea Grant (MDSG) (UMCES Policy III-7.11 Graduate Assistantships). The GSC created a new website in 2020 to house membership information, policies, and meeting minutes from Meet and Confer Meetings to make information more readily accessible to students (*UMCES Graduate Student Council*). The Assistant to the VPE sits on the GSC as a direct link to the Education Office for comments, questions, and concerns from students. In 2019, annual Meet and Confer Meetings were re-established after they stopped in 2015 (*UMCES GSC Meet and Confer 2019* and *UMCES Meet and Confer Meeting Minutes, 2020*). These meetings are in accordance with the *UMCES Policy III-7.11 Graduate Assistantships* and the system *USM Policy III-7.11 Graduate Assistantships* and allow UMCES graduate students to meet with the VPA, VPE, Director of HR, and the Assistant to the VPE to discuss issues specifically related to graduate students and graduate assistantships.

The UMCES President also meets at least annually with each of the governing councils to discuss short- and long-term plans of the councils as well as any concerns they may have regarding their input within UMCES shared governance structure (*UMCES Staff Council Meeting Minutes_Goodwin, April 2021; UMCES GSC Meeting Minutes 6-2-2020; Faculty Senate Meeting Minutes February 14 2019*).

Recommendations

UMCES hosts only a few informal gatherings per year and those are often at the Unit level. UMCES should encourage more informal gatherings and events, both virtual and in-person, to foster information sharing and development of a sense of community. This can be achieved by meeting more often with all the shared governance councils collectively. They can then help identify ways in which the UMCES community can become a more cohesive group through events, meetings, or informal gatherings.

4. Are the roles and authorities of the UMCES Administration, the USM Administration, and the USM Board of Regents sufficiently well-defined to ensure necessary institutional independence within the context of appropriate System oversight?

UMCES is governed by the USM BOR as are all institutions within the USM. The BOR has well-developed and comprehensive Policies and Procedures (*USM Board of Regents By-Laws*). The 21 members of the BOR are appointed by the Governor to five-year terms, with the exception of the Student Regent, who is appointed by the Governor to a one-year term. By statute, the Maryland State Secretary of Agriculture and Secretary of Commerce

are members of the BOR. All appointments, except for the Secretaries of Agriculture and Commerce, must receive consent of the Maryland State Senate. A current BOR members list, including biographies, is publicly posted (*USM Board of Regents Membership*).

USM Presidents and the Chancellor of the USM are specifically excluded from membership on the BOR. Moreover, BOR members must adhere to State Ethics laws and policies that require disclosure of potential or perceived conflicts of interest (*USM Policy I-7.00 Public Ethics of Members of the Board of Regents*). The BOR assists USM institutions, including UMCES, in the provision of resources needed to sustain and improve the institutions by regularly testifying before the Maryland General Assembly on behalf of USM. Additionally, many Regents actively assist USM institutions in philanthropic fundraising (*USM Board of Regents By-Laws*). The USM and decisions of its BOR are public and under the scrutiny of the Governor, General Assembly, the press, and the public in recognition of the importance of the USM to higher education and the economy of Maryland.

The current UMCES President was appointed by the BOR in 2017 at the recommendation of the Chancellor. The BOR charged a search committee made up of members of the USM, UMCES Community, and external community members. The President has primary responsibility to lead the institution toward accomplishing its mission and achieving its goals and is responsible for administration of the institution (*USM Board of Regents By-Laws, Article V*). Other leaders in UMCES, including members of the EC, have the appropriate educational background and professional experience to provide leadership for the institution. UMCES's administrative leadership structure basically mirrors other institutions within the USM. However, there are some differences due to UMCES's smaller size, focus on graduate education, and dedicated mission.

UMCES has its own Policies and Procedures under the umbrella of the USM Policies and Procedures (*UMCES Policies and Procedures*). The UMCES Policies and Procedures describe any differences from or additions to USM Policies and Procedures that are necessitated by UMCES unique institutional mission and structure. UMCES leadership fully participates with colleagues on key Councils and Committees of USM-wide coordinating bodies (Table 7.2). UMCES has equal representation with other USM institutions on those bodies. UMCES has clearly documented lines of organization and authority within the USM and within its own organization (Figure I.2). Periodically, UMCES reviews its organizational structure.

UMCES is an unusual institution of higher education, with a non-traditional mission. UMCES has a legislatively mandated mission to develop a predictive ecology for the State of Maryland and her citizens to aid in environmental decision making through research, education, and service (see Chapter 1). UMCES works particularly closely with State environmental agencies as well as those from local, federal, and international governments. Nevertheless, on a

Chancellor's Council**Council of University System Presidents** (*President, monthly*)**Vice President's Council** (*VPSI, three times per year*)**Administration and Finance Meeting** (*VP for Administration, monthly*)**Academic Affairs Advisory Council** (*VP for Education, monthly*)**Meeting of Vice Presidents for Development** (*VP for Strategic Initiatives, every two months*)**State Relations Committee** (*Chief of Staff, weekly during legislative session*)**Human Resources Committee** (*Director of Human Resources, quarterly*)**Council of University of Faculty System Faculty** (*Faculty Senate representatives, quarterly*)**Council of University System Staff** (*Staff Council representatives, monthly*)**University System of Maryland Student Council** (*Student Council representatives, monthly*)**University Communications Council** (*Director of Communications, quarterly*)**Meeting of Budget Directors** (*Comptroller and Budget Manager, quarterly*)**System Research Administration Group** (*Director of Research Administration and Comptroller, quarterly*)**Information Technology Coordinating Council** (*CIO/Director of IT, 2–3 times per year*)**USM Global Engagement Advisory Committee** (*VPE Assistant, monthly*)

Table 7.2 – UMCES Serves on System-Wide Coordinating Bodies

few past occasions the Maryland legislature has explored potential administrative efficiencies and/or cost savings to be gained by consolidating UMCES with other institutions in the USM. The most recent of these explorations occurred in 2018, when, at the behest of the Maryland Department of Legislative Services, the BOR reviewed UMCES's independence to consider consolidation with other institutions. The conclusions of this study were (*USM JCR Report on UMCES*):

- Any consolidation would likely have a negative impact on UMCES's unique focus and critical role advising the State on environmental matters, research and scientific information regarding restoration of Maryland's most valuable natural resource, the Chesapeake Bay.
- There would be no material cost savings or new efficiencies created, but damage would likely be done to this valuable and independent resource of applied scientific research for Maryland's pressing environmental challenges. As noted by the analysis, UMCES already shares back office and other administrative systems with other USM institutions. Related cost savings and efficiencies have long been realized.
- The report suggests a better alternative would be increased collaboration and expanded relationships between UMCES and other USM institutions.

Recommendations

The roles and responsibilities of the BOR, USM Administration, and UMCES Administration are clearly defined through policies and in practice. UMCES is sufficiently independent to meet its mission and goals. UMCES should continue to promote its unique, independent status within the USM, and should work to increase collaboration and expand relationships with other USM institutions.

5. Are UMCES policies and procedures well-established, organized, accessible, and clearly articulated?

Many policies and procedures are common to all USM institutions and therefore are overseen by the USM. To ensure clarity, all UMCES policies are aligned with USM policies and any differences are clearly documented on the UMCES website (*UMCES Policies and Procedures*). All changes to UMCES policies and procedures are documented, reported at Executive and Administrative Council meetings, and are transparent to the UMCES community and its stakeholders, clients, and reviewers. Many policies can also be found on the corresponding webpages for the groups they affect (*Faculty Senate Webpage, UMCES Graduate Education - Faculty Resources, UMCES Graduate Student Council, UMCES Staff Council Website*).

As required by the USM and its BOR, UMCES revisits its mission statement and institutional goals regularly (see Chapter 1). The latest review and approval of the UMCES Mission Statement by the BOR occurred in 2018. It is important to note that UMCES has long recognized the need for self-examination and planning, which it has done periodically by developing new strategic plans, most recently in the form of a Strategic Initiatives document in 2019 (*UMCES Strategic Initiatives, 2019*). The UMCES Facilities Master Plan approved by the BOR was most recently developed for 2020-30 and is updated every five years (*UMCES Facilities Master Plan (2012-2022)* and *UMCES Facilities Master Plan Update - 2018*). The Facilities Master Plan must be consistent with the structure, function, and mission of UMCES.

Recommendations

UMCES has time-proven policies and procedures in place that are well organized, accessible, and clearly articulated. UMCES is developing a plan to review all policies on a five-year basis. These reviews will allow for minor technical corrections and consideration of significant changes by the Administrative Council at regular intervals and should be initiated within the next two years

6. Is there sufficient administrative support to meet UMCES's institutional responsibilities without overly burdening the faculty?

UMCES does have sufficient administrative support to meet its institutional responsibilities without overly burdening the faculty. The UMCES faculty is supported by a wide range of institutional resources constituting a compact and diverse multi-disciplinary research network that encourages collaboration among its four Laboratories, as well as a dedicated science communications center. An efficient and skilled grants administration staff guides proposals through review and submission and maintains an ever-improving web-based proposal and grant submission tool. UMCES has invested substantial resources to facilitate research and scholarly enterprises by linking unique historical and specialized holdings at UMCES to the vast repositories within the USM that serve the diverse scholarly interests of its institutions.

In 2020, UMCES undertook an internal Administrative Review co-chaired by senior faculty and staff members (*UMCES Internal Research Administration Review 2020* and *UMCES Internal Research Administration Report Evidence Section*). The review committee made the following recommendations to enhance the efficiency and effectiveness of services particularly related to research administration:

- Enhance Office of Research Administration and

Advancement (ORAA) staff capacity

- Adopt a holistic grants management system
- Improve training and communication throughout UMCES
- Move beyond immediate need; advance strategic outcomes through external review and visioning.

Led by the Vice President for Administration, the recommendations are in various stages of review, implementation, and additional study (*UMCES Internal Administrative Review-ORAA Actions 2021*).

Another major administrative function within UMCES is procuring and maintaining scientific equipment to support advanced scientific research. As a graduate research institution seeking to produce the best possible science and attract the best students, the faculty requires substantial provisions of analytical equipment, seawater systems, greenhouses, research vessels, and IT resources to sustain the scientific enterprise.

The UMCES faculty is meaningfully engaged in the facilities planning process, and most decisions at UMCES involve some level of consultation with the faculty through shared governance bodies (at the Unit or University level). At individual Laboratories, Directors make strategic decisions on major equipment and instrument purchases, placing priority on ensuring competitive start-up packages for new faculty and on purchase of key multi-use instruments. Additionally, faculty members have written successful grant proposals to purchase scientific equipment and high-performance computing equipment that supports their research interests but can be accessed and utilized by other faculty members as well as graduate students.

Recommendations

UMCES recently completed an internal Administrative Review and should continue working to address its recommendations.

7. What procedures are followed for reviewing the effectiveness of the President, Vice Presidents, and Laboratory Directors?

Following detailed policies and procedures, the President, Vice Presidents, and Laboratory Directors undergo annual reviews by their supervisors and, every five years, comprehensive reviews by the UMCES community.

The President of UMCES is appointed by the BOR and reports to the Chancellor of the USM (see Figure I.2), who in turn reports to the BOR. The President has specific oversight authority as described in *USM Policy VII-5.00 Performance Evaluation of the Chancellor and the Institution Presidents*. Annually, the Chancellor reviews the President's performance in consultation with the BOR

based on accountability measures developed for each institution. The President is comprehensively reviewed every five years, with significant and substantial input from the UMCES faculty, staff, and students (*USM Policy VII-5.01 Multi-Year Review of USM Presidents*).

All members of the UMCES EC undergo an annual review by the UMCES President (*UMCES Policy VII-5.20 Performance Evaluation Program*). Additionally, UMCES Vice Presidents and Laboratory Directors undergo a comprehensive five-year review that includes evaluation by UMCES faculty, students, and staff (*UMCES Policy VII-5.02 Review of Laboratory Directors*). The 5-yr review Policy specifically describes the process for Laboratory Directors, but Vice President reviews have followed a similar approach (although not described in Policy). The Vice President for Science Application underwent such a review in 2015 and again in 2020. The four Laboratory Directors, who are appointees of the President, play a prominent role in guiding both research and education at their respective Laboratory Units. The Maryland Sea Grant College is administered by UMCES for the USM, with its Director reporting to the UMCES President.

While UMCES's leadership is regularly reviewed as described above, UMCES has not had an external institutional review since 2004 (*Report of the UMCES External Review Committee, 2004*). That external review concluded:

"In summary, the University System of Maryland is very fortunate to have an organization such as UMCES among its institutions. UMCES is clearly among the leading research institutions of its kind, with a very strong national and international reputation, with first-rate faculty and facilities, and with an emerging, high quality, graduate education program."

Recommendations

UMCES should update its policies on five-year review of Laboratory Directors to formally include Vice Presidents.

It is time for a rigorous external review of the UMCES scientific enterprise, including education components. This review should take place in 2024, 1 year before UMCES Centennial and occur regularly (every 8 years) thereafter. The external review should help inform the Institutional Assessment.

8. Are mechanisms in place to allow UMCES governance, leadership, and administration to adapt to changing needs, concerns, and mandates?

UMCES has substantial administrative flexibility to adapt to changing needs by changing policies and practices – all under oversight by the USM and BOR. UMCES is regularly reviewed and audited by the USM, the BOR, the MHEC, and the State of Maryland executive and legislative branches to ensure that it is meeting its mission while complying with federal and state laws, policies, and

procedures.

UMCES is a partner in the USM, with its broad mission, system-wide strategic plan, and policies that are common to all 12 institutions. UMCES also derives services from the USM, and especially from the University of Maryland College Park, allowing it to be a relatively flat institution with modest administrative overhead. All 12 USM institutions are accredited by MSCHE, ensuring that interactions by UMCES with, and services derived from, its sister institutions are held to a high standard. The assessment processes being followed system-wide clearly benefit UMCES. Monthly meetings of the Academic Affairs Advisory Council of provosts from the USM institutions, on which the UMCES VPE serves, are directed toward maintaining and improving the rigor and effectiveness of policies and procedures. Many system-wide policies and procedures are reviewed annually to evaluate how each of the USM institutions complies with academic standards, and meets expectations of enrollments, retention, and support of students.

UMCES engages in continuous and productive assessments and evaluation of performance. Many of these assessments are conducted in the spirit of shared governance that is common to UMCES. In these instances, assessments and strategic planning are conducted collaboratively by faculty and administration. In terms of strategic planning, the UMCES Administration responds to faculty agendas emerging through strategic planning by the FS and GFC. To improve leadership and address any personnel concerns, Laboratory Directors and Vice Presidents are reviewed by faculty every 5 years (*UMCES Policy VII-5.02 Review of Laboratory Directors*). The review policy was largely developed by the FS in collaboration with the Administrative Council. These reviews, in fact, also serve as assessments of institutional functions of the responsible administrators and, in this way, allow UMCES faculty, students, and staff to periodically express their views and levels of satisfaction of institutional function.

Effective assessment procedures and policies for the USM are in place to adapt to emerging issues and respond to recommendations. The procedures broadly guide and benchmark standards to which each USM institution, including UMCES, must subscribe. Examples of annual data assessments include the Managing for Results Report and the Dashboard Indicators Report that are reviewed by the Legislature and BOR, respectively (*Managing for Results Report - UMCES, Managing for Results Report Website, USM Dashboard Indicators - UMCES*). As a small and unique institution in the USM, UMCES has developed compatible, approved policies and procedures that adhere to USM policies while meeting its needs to assess programs and activities. UMCES also provides leadership to the USM in its development of policies and procedures related to environmental sustainability. President Goodwin serves as the USM Vice-Chancellor for Environmental Sustainability in addition to serving as President of UMCES. UMCES

completed its first formal Institutional Assessment in 2018, described in detail in Chapter 6.

In 2020, in response to changing needs and concerns, UMCES established the Diversity, Equity, and Inclusion Collaborative (DEIC), which is charged with recruiting faculty, students, and staff from underrepresented minorities in geoscience, and with promoting a climate of equity and inclusivity to help retain them (*DEIC Charge from President*). This group is already making valuable contributions to our institution and demonstrates that UMCES's governance, leadership, and administration operate adaptively.

Recommendations

None.

COVID-19 Impacts

The COVID-19 pandemic has highlighted that UMCES has the administrative and governance structures in place to successfully respond to emergencies and campus-wide challenges. Our flat administrative structure served UMCES well, but team members were stretched very thin, particularly as initial de-densification and subsequent return to campus planning and implementation phases were initiated. However, the enhanced level of communications within the USM and within UMCES greatly helped in our understanding of the impacts of COVID and gave us the ability to put in place the policies and decision-making processes necessary to minimize the pandemic's impact on the institution, its faculty, staff, and students, and its broader community.

Enhanced Governance and Communications within the USM

The President of UMCES serves on the Council of University System Presidents (CUSP) which normally meets monthly with the USM Chancellor and senior leadership team. These are generally only open to the institutional president or a stand-in if necessary. However, as early as January 2020, the Chancellor began holding CUSP meetings frequently, 1-3 times per week, while also opening most of these meetings up to a slightly broader group* within the institutions to discuss the potential challenges and various scenarios of COVID-19 for the USM-wide community. Most CUSP meetings included high level medical briefings, campus community challenges, and fiscal impact. Like much of the country's work and school environments, the USM campuses de-densified in March 2020 and have yet to return to full capacity. The CUSP meetings generally are less frequent now, but meetings occur at least 2-5 times per month depending upon the current circumstances and challenges.

(*UMCES President invited the VPA, VPE, Chief of Staff, and Chair of the "Return to Campus" Committee to CUSP meetings.)

Other sector meetings of the USM community also began to meet much more frequently including the Vice Presidents for Administration and Finance, Academic Affairs Advisory Council, Student Affairs Council, State Relations Council, Communications Council, Council on University System Faculty, Council on University System Staff, USM Student Council, among other groups. These meetings have significantly enhanced communication between UMCES and the USM leadership, as well as between institutions.

Enhanced Governance and Communications within UMCES

When the COVID pandemic was spreading throughout most of 2020, UMCES's EC or the Administrative Council was meeting nearly as frequently as the Council of University System Presidents to ensure wide-spread communication. Additionally, the President emailed the UMCES Community frequently and held virtual town hall meetings, giving updates, explaining new protocols and procedures, while also celebrating noted achievements of individuals.

To aid in communicating broadly to the UMCES Community of faculty, students, and staff, UMCES stood-up its COVID Crisis Communications Team and enhanced its membership** to be representative of the community it serves. Throughout 2020 these meetings occurred several times per month but became less frequent in 2021. Besides aiding the President's Office in its communication to the broad community, the Team also discussed best practices occurring within their units to aid in health and safety protocols, enhancing compliance within the community, aiding and anticipating external communications, such as newsletters and social media, ensuring that research descriptions and photos complied with best health and safety protocols.

(** The UMCES COVID Crisis Communications Team consists of the Chief of Staff (Chair), VPA (Vice Chair), Director of Communications (Vice Chair), VPE, Chair of the Faculty Senate, Chair of the Staff Council, Chair and Vice Chair of the Student Council, Director of Human Resources, HPL Director of Facilities, HPL Environmental Health and Safety Coordinator, CBL Associate Director, AL Associate Director, Sea Grant Associate Director, IMET Associate Director, and the IAN Director).

At the Unit level the frequency of sector meetings as well as Town Halls increased slightly to help broadcast the important new protocols and procedures to ensure the health and safety of the community while allowing for some limited research to occur. The President and other members of the UMCES leadership team were occasionally invited.

UMCES has a relatively small subset of staff who belong to a bargaining unit under the auspices of Maryland Classified Employees Association (MCEA). Throughout the pandemic more frequent meetings have occurred between the UMCES union representatives, UMCES

leadership team represented by the Director of HR, and MCEA. These meetings have largely been focused on health and safety protocols and procedures. MCEA has not called to re-open negotiations of the currently agreed upon contract with UMCES as our collaborative working relationship has remained positive.

A Responsive and Inclusive Administration for COVID-19 Institution Reactivation

The UMCES COVID Reactivation Committee was started via a charge from the UMCES EC (*Campus Reactivation Committee - Executive Council, final*) after the Maryland governor released his Roadmap to Recovery on April 24, 2020 (Maryland Strong Roadmap to Recovery). The committee was originally composed primarily of faculty and students who conducted laboratory work, field work, or a combination of the two, as well as representatives from some of the shared governance groups. The committee ensured that staff members, particularly those representing the facilities teams responsible for cleaning protocols, were included in all discussions, and added to the committee. The group met on an as needed basis as restrictions were lifted to develop new phase procedures that were in compliance with the state of Maryland. The goal was to allow for as much work as possible to continue on campus while maintaining a safe environment. UMCES entered Phase 1 on June 15, 2020, and Phase 2 on September 8, 2020 (*UMCES Return to Campus Plan, Phase 2, 11.16.20*). The committee recently completed drafting Phase 3, as vaccinations in the state increased. Given the current COVID-19 resurgence, UMCES remains mid-way between Phases 2 and 3, nominally in Phase 2.5.

Connections

This WG found connections to WG1, concerning UMCES's mission and goals (Chapter 1). For this standard, we sought to determine if UMCES "is governed and administered in a manner that allows it to realize its stated mission and goals in a way that effectively benefits the institution, its students, and the other constituencies it serves." The mission and goals of UMCES define the vision for which we strive through our governance structures.

We also found connections to WG2: Ethics and Integrity (Chapter 2). Both standards require robust review and assessment procedures to meet changing needs and address any conduct or situations that are counter to UMCES's mission and goals. Effective shared governance, leadership, and administration are vital to creating a workplace where transparency, honesty, and integrity are valued.

Finally, there are obvious connections between our discussion of governance, leadership, and administration and WG6's discussion of planning, resources, and institutional improvement (Chapter 6). These two topics are mutually interdependent.

Conclusions and Recommendations

Working Group VII found that the governance, leadership, and administration structures of UMCES allow it to effectively meet the institutional mission and goals of the institution, and the needs of the students and other stakeholders that it serves. This group found that graduate education remains a primary purpose of the institution and that it operates as an academic institution with the necessary autonomy. However, there are several ways in which UMCES can improve by considering the following recommendations:

UMCES does not have a traditional "institutional research" office. Data collection and analysis is spread amongst several offices including Vice President for Administration, Vice President for Education, Human Resources, Office of Research Administration and Advancement, and the Chief of Staff. We recommend that the different offices meet 1-2 times per year to discuss the types of data they collect, analyze, develop, and maintain to ensure that they are using common data sources and drawing similar conclusions. This may also lead to consolidation of data collection and maintenance.

UMCES should facilitate regular meetings of the governance bodies (Faculty, Staff, Students, Graduate Faculty, DEIC) so they can present their short- and long-term goals to each other. This would assist in coordinating efforts to identify mutual goals and develop strategies to assist the entire community in meeting them.

UMCES hosts only a few informal gatherings per year and those are often at the Unit level. UMCES should encourage more informal gatherings and events, to foster information sharing and development of a sense of community. This can be achieved by meeting more often with all shared governance councils collectively. They can then help identify ways in which the UMCES community can become a more cohesive group through events, meetings, or informal gatherings.

UMCES is developing a plan to review all policies every five years. This would allow for minor technical corrections and re-consideration by the Administrative Council of significant changes.

UMCES recently completed an internal Administrative Review and made the following recommendations to enhance the efficiency and effectiveness of services particularly related to research administration:

- Enhance ORAA staff capacity
- Adopt a holistic grants management system
- Improve training and communication throughout UMCES
- Move beyond immediate need; advance strategic outcomes through external review and visioning.

The UMCES Administration should continue working towards addressing the recommendations of the internal Administrative Review.

Conclusions *Conclusions and recommendations*

This final chapter of the UMCES 2021 Self-Study is presented as a convenience for the reader. It is a compilation of the purpose, primary conclusions, and primary recommendations of each of the standards-based chapters. This compilation was used as the basis for the more integrative discussion in the Executive Summary.

Chapter 1 - Mission and Goals

This chapter addressed MSCHE Standard I - The institution's mission defines its purpose within the context of higher education, the students it serves, and what it intends to accomplish. The institution's stated goals are clearly linked to its mission and specify how the institution fulfills its mission.

The primary conclusion of Chapter 1 was that UMCES complies with MSCHE Standard I. A one-page statement of functions, duties and activities is published as the 2018 Code of Maryland Regulations (COMAR), and the University System of Maryland (USM) Board of Regents (BOR) approved an official, multi-page statement of mission and goals for UMCES in 2014 and 2018, which also describes the broad participation of the parties contributing to the statement. The BOR-approved goals are properly aligned with the UMCES mission. The UMCES goals advance effectiveness and integration of scholarly research, research application, and student achievement and learning. The mission and goals statements are assessed and revised with sufficient frequency and broad engagement.

The primary recommendations for improvement were:

1. A single, very concise mission statement should be developed through discussions of faculty, staff, students, BOV, and communication experts and then used consistently in reports, web posting, etc., and committed to memory by everyone in the community.
2. Renewed attention and resources should be given to increasing diversity and inclusiveness within UMCES faculty, staff and student body, and to increasing enrollment of traditionally underrepresented groups within environmental science in general.
3. UMCES units should work together from the bottom up to assess how each unit is contributing to the broader UMCES missions and goals. This may also elevate some voices and opinions that may be overlooked in the present more top-down assessment strategy.

4. An external assessment group should be included periodically in the UMCES Institutional Assessment process to evaluate the overall state of UMCES's scientific and educational enterprises and progress toward achieving UMCES stated mission and goals.

Chapter 2 – Ethics and Integrity

This chapter addressed MSCHE Standard II - Ethics and integrity are central, indispensable, and defining hallmarks of effective higher education institutions. In all activities, whether internal or external, an institution must be faithful to its mission, honor its contracts and commitments, adhere to its policies, and represent itself truthfully.

The primary conclusion of Chapter 2 was that UMCES complies with MSCHE Standard II. UMCES demonstrates a strong culture of ethics and integrity, with policies and procedures in place to address a range of concerns, including protection of intellectual property, fair hiring and promotion practices, management of conflicts of interest, and diversity and inclusion. The commitment of UMCES's leadership to promoting integrity sets a tone for the entire institution. The established policies of UMCES, UMCP, and the USM for policies regarding graduate students, and UMBC for policies regarding intellectual property and tech transfer, provide a clear framework that is both transparent and robust. One area of weakness was identified with respect to MSCHE criterion 9 about periodic assessment of policies, processes, practices, and their manner of implementation.

The primary recommendations for improvement focused on enforcement and refinement of existing UMCES practices:

1. There is a clear need for an UMCES ombuds program for informal discussion of grievances and assistance in the resolution of conflicts. This program should be implemented in the next two years.
2. While there are systems in place to help UMCES promote diversity, equity, and inclusion, more can be done. The newly established DEIC should continue to plan for and implement improvements in DEI at UMCES. The Executive Council and President's Office should continue to support DEI efforts across the institution..

3. There should be a formal system for regular review of current policies. A group of faculty, staff, students, and administrators should be assembled every five years to review policies and make recommendations. This will help UMCES identify areas for improvement and adapt to changing situations, building on an already strong foundation.

Chapter 3 – Design and Delivery of the Student Learning Experience

This Chapter addressed MSCHE Standard III - An institution provides students with learning experiences that are characterized by rigor and coherence at all program, certificate, and degree levels, regardless of instructional modality. All learning experiences, regardless of modality, program pace/schedule, level, and setting are consistent with higher education expectations.

Chapter 3 was the longest and most directly focused on delivery of a quality graduate education experience to UMCES students. The primary conclusion of Chapter 3 was that UMCES complies with MSCHE Standard III.

Other important conclusions were:

1. UMCES meets its educational mission through clearly defined policies and standard practices that provide effective shared governance and oversight of educational programs.
2. UMCES offers research-based Master of Science and Doctor of Philosophy degrees that leverage UMCES's reputation for high quality fundamental and applied environmental research and the institution's strong connections to resource management and policy agencies and foundations.
3. UMCES educational programs are centered around its intellectual leadership of the USM-wide graduate program in Marine, Estuarine and Environmental Sciences (MEES). MEES offers a forward looking, interdisciplinary training that combines elements of social science with a strong foundation in natural sciences. Furthermore, the MEES curriculum offers extensive professional development opportunities for students that include training in quantitative analysis, scientific communication and responsible conduct of research.
4. Through MEES, UMCES provides a regularly scheduled, dependable curriculum that allows students to complete the clear expectations of their program of study, while undertaking state of the art research.
5. UMCES faculty are highly qualified to develop and undertake the institution's education mission.
6. Support for and opportunities to implement improvements to UMCES educational programs have increased substantially over the past 5 years.

The primary recommendations for improvement were:

1. The Education pages of the UMCES web site should be redesigned and brought up to date to the benefit of potential students, current students and faculty alike. An effective redesign of the web site also offers an opportunity to brand the institution more strongly.
2. UMCES should commit to and incentivize continued training for faculty in course and instructional design, and in integration and implementation of learning outcomes to guide course and curricula improvements. These goals will be best achieved through partnerships with other USM institutions and through more consistent integration of educational activities in annual faculty reviews.
3. UMCES should continue to lead the MEES program towards continuing improvement through rigor and innovation, with national leadership of interdisciplinary training in the environmental sciences as its ultimate goal.

Chapter 4 - Support of the Student Experience

This Chapter addressed MSCHE Standard IV - Across all educational experiences, settings, levels, and instructional modalities, the institution recruits and admits students whose interests, abilities, experiences, and goals are congruent with its mission and educational offerings. The institution commits to student retention, persistence, completion, and success through a coherent and effective support system sustained by qualified professionals, which enhances the quality of the learning environment, contributes to the educational experience, and fosters student success.

The primary conclusion of Chapter 4 was that UMCES is in full compliance with MSCHE Standard IV. In support of its educational mission, UMCES has committed to supporting its students throughout their tenure in graduate school. Policies and procedures are in place to ensure that students continue to have access to necessary financial and other broad student support resources, from wellness to professional development. UMCES is responsive to student requests for additional support and is committed to grow and improve in the areas indicated in the recommendations.

The primary recommendations for improvement were:

1. UMCES should enhance its website regarding student financial information, including adding available student funding and fellowships, clarifying the need for funding once accepted, clearly stating information about stipend levels and benefits, and outlining the cost of living at the various campuses.
2. UMCES should review the Graduate Assistant (GA) appointment letter to ensure comprehensive and uniform financial information is being relayed to all

incoming GAs.

3. While UMCES students have access to available ombudspersons through the Universities where they matriculate, UMCES should continue working toward the formation of its own ombuds office or group to better serve the needs of the student population.
4. UMCES should continue to recruit underrepresented minority students for high school and undergraduate internship programs.
5. UMCES should recruit underrepresented minority graduate students using the UMCES/MEES Enhancement Funds program described under Question 1.
6. UMCES should continue to assess student needs on a regular basis, for example through campus climate assessments and regular Institutional Assessments, which will allow students to provide regular, anonymous feedback on their experiences at UMCES.
7. UMCES should institute implicit bias and sensitivity trainings for faculty, staff, and students.
8. UMCES should continue to develop and review student-advisor mutual expectations documents to improve communication and understanding.
9. UMCES should monitor and evaluate the success of each mitigation strategy to address the geographical diversity of the institution regarding student support.
10. UMCES should standardize the lab specific orientation to ensure uniformity of information.
11. UMCES should continue the UMCES-wide virtual seminars that were conducted during COVID travel restrictions, and should facilitate virtual UMCES-wide student meetings at regular intervals.
12. Within two years, the VPE Office should develop database and portal tools to aid in comprehensively tracking and communicating with UMCES alumni.
13. UMCES should continue to poll students on the adequacy of student services at UMCES and should use the 2018 UMCES Institutional Assessment results to guide near term improvements.

Chapter 5 - Educational Effectiveness Assessment

This chapter addressed MSCHE Standard V - Assessment of student learning and achievement demonstrates that the institution's students have accomplished educational goals consistent with their program of study, degree level, the institution's mission, and appropriate expectations for institutions of higher education.

The primary conclusion of Chapter 5 was that UMCES is well on its way toward meeting expectations identified by MSCHE Standard V. Since gaining accreditation, UMCES has made significant strides towards improving assessment of student learning and achievement. In the coming years UMCES is on track to implement fully the plan it has developed to assess and improve student learning outcomes and thus be more effective in carrying out its mission.

The primary recommendations for improvement include:

1. UMCES should make its educational goals more easily discoverable.
2. UMCES should develop, disseminate and assess institutional-level learning outcomes, continuing along the path of student and program learnings developed to date.
3. UMCES should implement and evaluate a trial phase of its new learning outcomes assessment plan in 2021-2022. UMCES should implement the full plan to assess and improve student learning outcomes during the 2021-2022 academic year.
4. UMCES should use assessment results for course and program improvement.
5. UMCES should continue to align its learning outcomes assessment procedures with its partners.
6. UMCES should develop procedures to evaluate and improve the educational effectiveness assessment process itself.

Chapter 6 - Planning, Resources, and Institutional Improvement

This chapter addressed MSCHE Standard VI - The institution's planning processes, resources, and structures are aligned with each other and are sufficient to fulfill its mission and goals, to continuously assess and improve its programs and services, and to respond effectively to opportunities and challenges.

The primary conclusion of Chapter 6 was that UMCES exhibits a high level of compliance with MSCHE Standard 6. Overall, UMCES succeeds in supporting its mission, personnel, and students through effective resource allocation methodologies and assessments. UMCES has developed an institutional culture that values Institutional Assessment and its contributions to continued excellence and service. However, limited institutional funding resources must be addressed to grow the institution and provide a higher level of faculty, staff and student support.

The primary recommendations for improvement were:

1. Implementation of a new financial model would help to grow the institution in line with its Strategic Initiatives plan and develop new revenue opportunities that are not currently being pursued. This new financial model should include a focus on enhanced student service functions and the restoration of facilities renewal funding.
2. UMCES Faculty Senate efforts to enhance and standardize faculty performance evaluations should continue to be a priority.

Chapter 7 - Governance, Leadership, and Administration

This chapter addressed MSCHE Standard VII - The institution is governed and administered in a manner that allows it to realize its stated mission and goals in a way that effectively benefits the institution, its students, and the other constituencies it serves. Even when supported by or affiliated with governmental, corporate, religious, educational system, or other unaccredited organizations, the institution has education as its primary purpose, and it operates as an academic institution with appropriate autonomy.

The primary conclusion of Chapter 7 was that UMCES effectively meets the criteria set forth in MSCHE Standard VII. The governance, leadership, and administration structures of UMCES allow it to effectively meet the institutional mission and goals of the institution, and the needs of the students and other stakeholders that it serves. Graduate education remains a primary purpose of UMCES and it operates as an academic institution with the necessary autonomy. However, there are several ways in that UMCES can improve by considering the following recommendations:

UMCES does not have a traditional “institutional research” office. Data collection and analysis is spread amongst several offices including Vice President for Administration, Vice President for Education, Human Resources, Office of Research Administration and Advancement, and the Chief of Staff. The different offices should meet 1-2 times per year to discuss the types of data they collect, analyze, develop, and maintain to ensure that they are using common data sources and drawing similar conclusions. This may also lead to consolidation of data collection and maintenance.

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UMCES is developing a policy to review all policies at regular, five-year intervals. This will allow for minor technical corrections and re-consideration by the Administrative Council of significant changes.

UMCES recently completed an internal Administrative Review and made the following recommendations to enhance the efficiency and effectiveness of services related to research administration:

1. Enhance ORAA staff capacity.
2. Adopt a holistic grants management system.
3. Improve training and communication throughout UMCES.
4. Move beyond immediate need; advance strategic outcomes through external review and visioning

The UMCES Administration should continue working towards addressing the recommendations of this Administrative Review.

Appendix A *UMCES MSCHE Self-Study 2021 Working Group and Steering Committee Membership*

Working Group Membership

Working Group 1: Mission and Goals

Eric Davidson, past Director and Professor, AL, (Chair)
 Jeffrey Cornwell, Associate Research Professor, HPL
 Matthew Fitzpatrick, Associate Professor, AL
 Jacqueline Grebmeier, Research Professor, CBL
 Eric Schott, Associate Research Professor, IMET
 Lora Harris, Associate Professor, CBL
 Jenna Linhart, Faculty Research Assistant, AL
 Amanda Lawrence, Graduate Research Assistant, IMET
 Louis Plough, Associate Professor, HPL
 Amy Pelsinsky, Director of Communications, CA

Working Group 2: Ethics and Integrity

Russell Hill, Director and Professor, IMET, (Chair)
 Christine Knauss, Graduate Research Assistant, HPL
 Helen Bailey, Associate Research Professor, CBL
 Kennedy Paynter, Associate Professor, CBL, and former MEES Director
 Kenny Rose, Professor, HPL
 Judith O'Neil, Associate Research Professor, HPL
 Nina Lamba, Assistant Director, IMET
 J. Sook Chung, Professor, IMET
 Cindy Palinkas, Associate Professor, HPL
 Bob Hilderbrand, Associate Professor, AL

Working Group 3: Design and Delivery of the Student Learning Experience

Thomas Miller, Director and Professor, CBL, (Chair)
 Reed Brodrik, Graduate Research Assistant, CBL
 Johan Schijf, Associate Professor, CBL
 Andrew Elmore, Professor, AL
 Lauren Jonas, Graduate Research Assistant, IMET
 Carys Mitchelmore, Professor, CBL
 Patricia Glibert, Professor, HPL
 Allen Place, Professor, IMET
 Dylan Tallie, Graduate Research Assistant, AL
 Ryan Woodland, Assistant Professor, CBL

Working Group 4: Support of the Student Experience

Michael Roman, Director and Professor, HPL, (Chair)
 Victoria Coles, Associate Professor, HPL
 Anna Windle, Graduate Research Assistant, HPL
 Jeremy Testa, Associate Professor, CBL
 Amy Griffin, Assistant to the Vice President for Education, CA
 Claire Nemes, Graduate Research Assistant, AL
 Christopher Rowe, Associate Professor, CBL
 Tsvetan Bachvaroff, Assistant Research Professor, IMET
 David Secor, Professor, CBL

Working Group 5: Educational Effectiveness Assessment

David Nelson, Director and Professor, AL, (Chair)
 Lawrence Sanford, Vice President for Education and Professor, HPL
 James Pierson, Associate Professor, HPL
 Yantao Li, Associate Professor, IMET
 Isabel Sanchez-Viruet, Graduate Research Assistant, CBL
 Joel Bostic, Graduate Research Assistant, AL
 Michael Gonsior, Associate Professor, CBL

Working Group 6: Planning, Resources, and Institutional Improvement

Lynn Rehn, Vice President for Administration, CA (co-Chair)
 William Dennison, Vice President for Science Applications and Professor (co-Chair)
 Jeff Miley, Assistant Director for Facilities, HPL
 Lisa Ross, Director of Human Resources, CA
 Stacy Hutchinson, Associate Director of Administration, CBL
 Angela Richmond, Director of ORAA, CA
 Lori Stepp, Executive Assistant to the President
 Caroline Donovan, Program Manager, IAN
 Heather Johnson, Associate Director, AL
 David Nemazie, Chief of Staff, CA
 Michelle Prentice, Programs Coordinator, IMET

Ming Li, Professor, HPL

Mario Tamburri, Professor, CBL

Stuart Clarke, Vice President for Strategic Initiatives, CA

Working Group 7: Governance, Leadership, and Administration

David Nemazie, Chief of Staff, (Chair)

Hongsheng Bi, Associate Professor, CBL

Christina Goethel, Graduate Research Assistant and Past Chair of the UMCES Graduate Student Council, CBL

Rosemary Jagus, Professor, IMET

Michael Wilberg, Chair of UMCES Faculty Senate and Professor, CBL

William Dennison, Vice President for Science Applications and Professor, IAN

Keith Eshleman, Professor, AL

Mark Cochrane, Professor, AL

April Lewis, HR Administrator and Chair of Staff Council, CA

Lisa Wainger, Research Professor, CBL

Raleigh Hood, Professor, HPL

Suzi Spitzer, Student, IAN

Julianna Brush, Contract and Grant Specialist, HPL

Stephanie Cleary, Office Coordinator, CA

Steering Committee Membership

Lawrence Sanford, Vice President for Education and Professor (Co-chair)

Lynn Rehn, Vice President for Administration (Co-chair of Steering Committee and WG6)

Eric Davidson, past Director and Professor, AL, and Chair of WG1

Russell Hill, Director and Professor, IMET, and Chair of WG2

Thomas Miller, Director and Professor, CBL, and Chair of WG3

Michael Roman, Director and Professor, HPL, and Chair of WG4

David Nelson, Director and Professor, AL, and Chair of WG5

William Dennison, Vice President for Science Applications and Professor, and co-Chair of WG6

David Nemazie, Chief of Staff and Chair of WG7

Joann Boughman, Senior Vice Chancellor for Academic and Student Affairs, USM

Robert Neall, USM Board of Regents

Charles Monk II, Chair, UMCES Board of Visitors

Thomas Lingan, Member, UMCES Board of Visitors

Steve Fetter, Associate Provost and Dean of the Graduate School at UMD

Fredrika Moser, Director, Maryland Sea Grant

Michael Wilberg, past Chair, UMCES Faculty Senate

Kurt Florez, Chair, UMCES Staff Council

Christina Goethel, past Chair of the UMCES Graduate Student Council

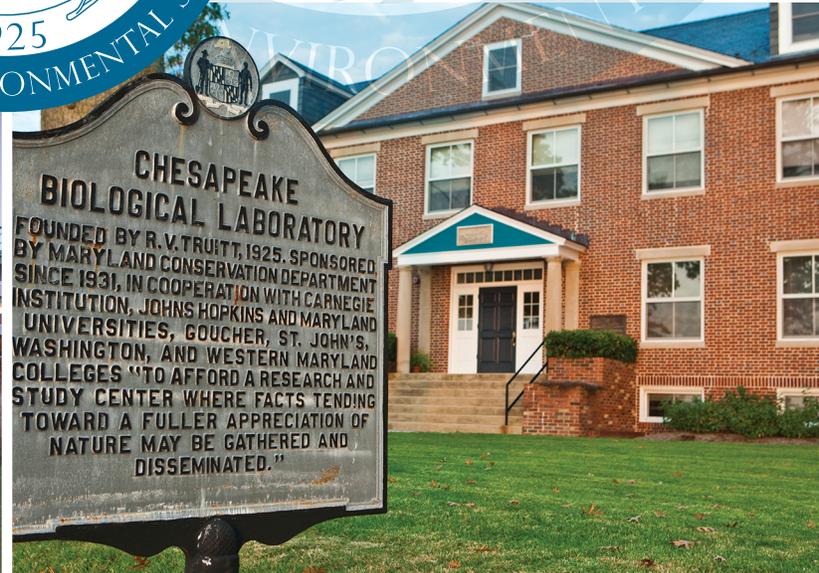
Steering Committee Ex Officio members:

Peter Goodwin, UMCES President

Amy Griffin, Assistant to the VPE and Accreditation Administrator

Vice President for Strategic Initiatives (formerly Stuart Clarke, now vacant)

Edward Houde, past UMCES VPE and Professor Emeritus, CBL



Laboratories of the University of Maryland Center for Environmental Science: Horn Point Laboratory (upper left); Chesapeake Biological Laboratory (upper right); Institute of Marine and Environmental Technology (lower left); Appalachian Laboratory (lower right).