Table 6: LMRCSC II Core Competency Rubric and Learning Objectives

	0	1 = Awareness	2 = Basic	3 = Intermediate	4 = Advanced	5 = Expert
	No exposure to this material	Understanding level in Bloom's Taxonomy	Applying level in Bloom's Taxonomy	Analyzing level in Bloom's Taxonomy	Evaluating level in Bloom's Taxonomy	Creating level in Bloom's Taxonomy
Competency 1: Stock Assessment Support and Information						
Learning Objective 1.1:Analyze data from surveys or fisheries with statistical methods such as GLM, GAM, machine learning or geostatistical models, to estimate population abundance, distribution, or catch/bycatch		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 1.2: Apply simple fisheries stock assessment models like logistic models and data limited methods		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 1.3:Apply integrated stock assessment models such as statistical catch at age models or catch at length models		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 1.4. Measure or model fundamental biological processes including growth, recruitment, maturity, movement, diet, mortality, and the factors that influence these processes in ecosystems.		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 1.5: Understand fisheries sustainability reference points and how population dynamics model outputs are used in fishery management		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript

Competency 2: Climate Impacts on Marine Ecosystems						
Learning Objective 2.1: Understand the major impacts of climate change on marine ecosystems, including warming temperatures and ocean acidification. Understand how these impacts can directly and indirectly impact marine populations, including their reproduction, growth, mortality, diseases and contaminants, and sustainability.		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 2.2: Develop the ability to collect, collate, and synthesize physical and biological data from marine and coastal system.		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 2.3: Understand the principles of Ecosystem-Based Fisheries Management (EBFM) and how data on living marine resources, such as diet composition and individual and population growth rates, can be incorporated into EBFM.		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Competency 3: Habitats and Biological Systems						
Learning Objective 3.1: The characteristics of habitats required for the health and sustainability of fish, invertebrate, and marine mammal populations		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 3.2: The impacts on		Annual Assembly	≥C in 300 or 400 level	≥B in 600 level course on the topic;	NERTO or other research	Thesis or Dissertation

marine habitats, ecosystems, and populations caused by fishing, bycatch, development, nutrient and sediment overload, anoxia, and HABs.			course on the topic	or undergraduate research opportunity	activity on the topic; or senior thesis	Chapter, submitted manuscript
Learning Objective 3.3: Conservation and restoration of marine habitats and populations, particularly for fragile habitats such as coral reefs and estuaries.		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Competency 4: Seafood, Nutrition, Aquaculture, and Pathology						
Learning Objective 4.1: understand the diversity of Aquaculture in fisheries science		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity		
Learning Objective 4.2: Aquaculture food safety and product nutrition, biosecurity		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 4.3: Aquaculture animal health and biosecurity, fish nutrition and sanitation, sustainable feeds		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 4.4: Knowledge and technologies for recirculating aquaculture		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 4.5: Aquaculture in the environment, Aquaculture genetics and biosecurity		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 4.6: Aquaculture and seafood regulations, stakeholders, extension		Annual Assembly	≥C in 300 or 400 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript

Competency 5: Social Science and Human Dimensions						
Learning Objective 5.1: Examining the connections between social science and decision making.		Annual Assembly	≥C in 1000 level course on the topic	≥B in 600 level course on the topic; or undergraduate - research opportunity or ≥C in 300 or 400 level course on the topic		
Learning Objective 5.2: Identify and connect social science (including economics, policy, culture, etc) to fisheries science and research		Annual Assembly		≥B in 600 level course on the topic; or undergraduate - research opportunity or ≥C in 300 or 400 level course on the topic	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 5.3: Determine the connections between species management, ecosystem valuation and economic value		Annual Assembly	≥C in 100 level course on the topic	≥B in 600 level course on the topic; or undergraduate - research opportunity or ≥C in 300 or 400 level course on the topic	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 5.4: Understand the cultural connections to fisheries and the communities they serve.		Annual Assembly	≥C in 1000 level course on the topic	≥B in 600 level course on the topic; or undergraduate - research opportunity or ≥C in 300 or 400 level course on the topic	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Competency 6: Data Management and Analysis						
Learning Objective 6.1: Clean, format, and organize data for analysis in Excel, R or other data management system		LMRCSC data management workshop, undergraduate or graduate	≥C in 100 to 200 level course on the topic	≥B in 600 level course on the topic; or undergraduate research opportunity	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Learning Objective 6.2:Write and use a data management plan, including producing meta-data and archiving data		LMRCSC data management workshop, undergraduate or graduate	Student receives LMRCSC data management plan and discusses with advisor or program director	Advisor and PD make sure student is following LMRCSC DMP and relevant university policies throughout research	Student submits a proposal with a data management plan	Student submits meta-data to LMRCSC archive, and data to appropriate archive
Learning Objective 6.3:Manipulate, analyze and display data with R, Python, or		LMRCSC data management workshop, undergraduate or graduate	advanced workshop training -min 2-day	Graduate ≥B in 600 level course in statistics; or undergraduate ≥C in	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript

other statistics software				300 or 400 level course in statistics		
Learning Objective 6.4: Access and query relational databases such as Oracle using SQL		LMRCSC data management workshop, undergraduate or graduate	advanced workshop training -min 2-day	Graduate ≥B in 600 level course in statistics; or undergraduate ≥C in 300 or 400 level course in statistics	NERTO or other research activity on the topic; or senior thesis	Thesis or Dissertation Chapter, submitted manuscript
Competency 7: Technical and Professional Communications						
Learning Objective 7.1: Develop skills and strategies for authoring and delivering poster presentations		Attend a poster session	Attend LMRCSC poster workshop	Present poster at university or center level conference	Present at least one poster at a regional or national professional meeting	Present multiple posters at professional meetings
Learning Objective 7.2: Develop skills and strategies for authoring and delivering oral presentations		Attend oral presentation at a regional or national meeting	Attend LMRCSC presentation workshop	Make an oral presentation at a university or center level conference or seminar	Make an oral presentation at	Present at more than one national meeting and/or oral defense of thesis of dissertation
Learning Objective 7.3: Develop skills for authoring scientific manuscripts		Complete LMRCSC module on Introduction to Primary Literature	≥C in 300-400 level technical course on the topic	≥B in 600 level technical writing course; Co-author of accepted peer reviewed article	Complete thesis or dissertation	Primary author of accepted peer reviewed article
Learning Objective 7.4: Develop skills for successful job interviews		Asynchronous training through Evergreen content collection	Participation in Cross-CSC workshop	Practice interviews Writing Retreat and/or via video conference		
Learning Objective 7.5: Develop skills at resume/cv writing		Asynchronous training through Evergreen content collection	Participation in Cross-CSC workshop	Mock hiring committee evaluation and feedback		
Learning Objective 7.6: Develop skills for communicating with the public about scientific results		Participate in Center or other Seminar on Science Communication, particularly Citizen Science	Participating in a Citizen Science project as a volunteer; participating in the delivery of K-12 STEM activities	Undergraduate research project including Citizen Science Component	Collaborate with/develop a Citizen Science plan	Citizen Science component to Thesis or Dissertation;
Competency 8: Other Professional Skills						
Learning Objective 8.1: Develop strategies			Engage in discussion of conflict			

	for professional conflict management			management strategies at the Annual Assembly professional development session			
	Learning Objective 8.2: Develop strategies for effective time management			Create a color coded personal time management plan at the Annual Assembly professional development session			

Milestones for progress monitoring: Each fellow's progress through the core competencies will be marked by the milestones described in Table 7. These milestones are based on expected completion dates. Completion dates will be recorded in the NOAA Office of Education Student Tracker version 2.1. The tracker is a product of the National Oceanic and Atmospheric Administration, Office of Education Educational Partnership Program award number (NA21SEC4810005). Its contents are solely the responsibility of the award recipient and do not necessarily represent the official views of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Courses approved by the center will be taught by faculty at partner institutions. All center workshops, seminars and in person meetings will be conducted by content experts in the workshop field. Core competency milestones will be tracked in the learning management system and the Completion dates will be recorded in the NOAA Office of Education Student Tracker. Record reviews will occur bi-annually until the fellow graduates with terminal degree.

Table 7: Core competency milestones

Task	Undergraduate	Graduate
Development Plan Complete	At First Annual Fellows Assembly	
Type Core Completed	At First Annual Fellows Assembly	
Social Science Completed	≥100 level Social Science Course +training from Evergreen Collection	≥400 level Social Science Course + training from Evergreen Collection
Data Science Completed	≥100 level Social Science Course +training from Evergreen Collection	Data Carpentry Workshop
Responsible Conduct of Research Training Completed	CITI training completion	