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Utah System of Higher Education
New Academic Program Proposal
Cover/Signature Page - Abbreviated Template

Institution Submitting Request: Utah State University
 Proposed or Current Program Title: Climate Adaptation Science (CAS)
 Sponsoring School, College, or Division: University (UN)
 Sponsoring Academic Department(s) or Unit(s): Applied Economics; Biology; Civil & Environmental Engineering; Environment & Society; Mathematics & Statistics; Plants Soils and Climate; Sociology, Social Work & Anthropology; Wildland Resources; Watershed Sciences
 Classification of Instructional Program Code¹ : 30.99 Multi/Interdisciplinary Studies, Other
 Min/Max Credit Hours Required of Full Program: 9 / 9
 Proposed Beginning Term²: Spring 2017
 Institutional Board of Trustees' Approval Date: 01/06/2017

<input type="checkbox"/> Certificate of Proficiency	<input type="checkbox"/> Entry-level CTE CP	<input type="checkbox"/> Mid-level CP
<input type="checkbox"/> Certificate of Completion		
<input type="checkbox"/> Minor		
<input type="checkbox"/> Graduate Certificate		
<input type="checkbox"/> K-12 Endorsement Program		
<input checked="" type="checkbox"/> NEW Emphasis for Regent-Approved Program	<i>Current Program BOR Approval Date:</i> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 5px;">Propose a NEW Emphasis</div>	
<input type="checkbox"/> Out of Service Area Delivery Program		

Chief Academic Officer (or Designee) Signature:

I, the Chief Academic Officer or Designee, certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

Laurens H. Smith _____

Date: January 4, 2017

I understand that checking this box constitutes my legal signature.

¹ For CIP code classifications, please see <http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55>.

² "Proposed Beginning Term" refers to first term after Regent approval that students may declare this program.

Utah System of Higher Education
Program Description - Abbreviated Template

Section I: The Request

Utah State University requests approval to offer the following Degree: Climate Adaptation Science (CAS) emphases effective Spring 2017. This program was approved by the institutional Board of Trustees on January 6, 2017.

Section II: Program Proposal/Needs Assessment

Program Description/Rationale

Present a brief program description. Describe the institutional procedures used to arrive at a decision to offer the program. Briefly indicate why such a program should be initiated. State how the institution and the USHE benefit by offering the proposed program. Provide evidence of student interest and demand that supports potential program enrollment.

Utah State University has received a \$2.7 million National Science Foundation (NSF) Research Traineeship award that will afford USU students the opportunity to pursue advanced interdisciplinary research training and a Climate Adaptation Science specialization. The NSF Research Traineeship Program is designed to encourage the development and implementation of bold, new potentially transformative models for STEM graduate education training. The Traineeship Track is dedicated to effective training of STEM graduate students in high priority interdisciplinary research areas, through the comprehensive traineeship model that is innovative, evidence-based, and aligned with changing workforce and research needs.

This proposal is to create the Climate Adaptation Science (CAS) specialization within eleven MS and nine PhD degrees, offered in nine departments and five colleges. The training program emphasizes interdisciplinary research and integrates training in informatics, modeling, communication, leadership, project management, risk assessment, decision-making under uncertainty, and interdisciplinary teamwork. Project research will advance understanding of changing hydroclimate (drought and flood), fire regimes (frequency, area burned, and severity), land cover (range shifts and invasions), social and economic effects, and potential adaptations. The project closely integrates research, instruction, and real-world experience and will foster collaborations among scientists, federal, state, and local land managers, policy-makers, trainees, and citizen stakeholders. The specialization requires nine credit hours, and will substitute for the current minors, specialization, or elective requirement that already exist in each of the participating degree programs. The participating degree programs are: MS in Applied Economics, Biology, Civil and Environmental Engineering, Climate Science, Ecology, Economics and Statistics, Environment and Society, Geography, Industrial Mathematics and Statistics, Sociology, and Watershed Sciences; PhD in Biology, Civil and Environmental Engineering, Climate Science, Ecology, Economics, Environment and Society, Mathematical Sciences, Sociology, and Watershed Sciences.

Labor Market Demand

Provide local, state, and/or national labor market data that speak to the need for this program. Occupational demand, wage, and number of annual openings information may be found at sources such as Utah DWS Occupation Information Data Viewer (jobs.utah.gov/jsp/wi/utalmis/gotoOccinfo.do) and the Occupation Outlook Handbook (www.bls.gov/oco).

The CAS specialization will complement existing graduate programs that are currently offered at Utah State University. The specialization will provide students with excellent career preparation for STEM professions by providing students with the

means to draw on the power of data-enabled science and emphasizing interactive skills such as effective writing and speaking, cross-disciplinary thinking, and collaborative work. The National Science Foundation has funded this program because of the demand for STEM professionals with strong occupational skills. Data from the U.S. Bureau of Labor Statistics (BLS) support that assertion. Employment in occupations related to STEM is projected to grow to more than 9 million by 2022. (Occupational Outlook Quarterly, Spring 2014. Found at: <http://www.bls.gov/careeroutlook/2014/spring/art01.pdf>)

Consistency with Institutional Mission/Impact on Other USHE Institutions

Explain how the program is consistent with the institution's Regents-approved mission, roles, and goals. Institutional mission and roles may be found at higheredutah.org/policies/policyr312/. Indicate if the program will be delivered outside of designated service area; provide justification. Service areas are defined in higheredutah.org/policies/policyr315/.

The CAS specialization emphasizes interdisciplinary research and skill building and encourages a diversity of thought and culture. The curriculum and professional, community-based internship will provide students with skills to serve the public consistent with the mission of Utah State University.

Finances

What costs or savings are anticipated in implementing the proposed program? If new funds are required, indicate expected sources of funds. Describe any budgetary impact on other programs or units within the institution.

The CAS specialization will be funded by a grant from the National Science Foundation; no additional resources will be required from the university. More applications may be received by participating departments due to an increase in interest in the programs offering the CAS specialization. No new physical facilities or modifications to existing facilities will be required. There is no need to hire additional faculty for this program, as the novel educational elements to be provided will substitute for current graduate teaching assignments. The project implements and assesses innovations that are expected to improve graduate training and result in increased retention, decreased time to degree for PhD students, and increased job placement flexibility and satisfaction.

Section III: Curriculum

Program Curriculum

List all courses, including new courses, to be offered in the proposed program by prefix, number, title, and credit hours (or credit equivalences). Indicate new courses with an X in the appropriate columns. The total number of credit hours should reflect the number of credits required to receive the award. For NEW Emphases, skip to emphases tables below.

For variable credits, please enter the minimum value in the table below for credit hours. To explain variable credit in detail as well as any additional information, use the narrative box below.

		Course Number	NEW Course	Course Title	Credit Hours
General Education Courses (list specific courses if recommended for this program on Degree Map)					
General Education Credit Hour Sub-Total					
Required Courses					
+	-	CAS 6001	X	Interdisciplinary Research Colloquium	1
+	-	CAS 6002	X	Climate Adaptation Science Studio 1	2
+	-	CAS 6003	X	Climate Adaptation Science Studio 2	2
+	-	CAS 6004	X	Climate Adaptation Science Internship 1	0
+	-	CAS 6005	X	Climate Adaptation Science Internship 2	0
+	-	CAS 6006	X	Science Communication Capstone	0
+	-				
+	-				
Required Course Credit Hour Sub-Total					5
Elective Courses					
+	-			A selection of 4 credits of elective short courses will be drawn from <input type="checkbox"/>	
+	-	MATH 6910.002		Stochastic Models and Simulation in Biology	1
+	-	WILD 6510		Topics in Spatial Ecology	1
+	-	WATS 6840		Fluvial Hydraulics and Ecohydraulics	1
+	-	PSC/WATS 6900		Modeling Environmental Change	1
+	-				
Choose of the following courses:					
+	-				
+	-				
Elective Credit Hour Sub-Total					4
Core Curriculum Credit Hour Sub-Total					9
Propose a NEW Emphasis to an existing Regent approved program					

Program Curriculum Narrative

Describe any variable credits. You may also include additional curriculum information, as needed.

Progress through the CAS specialization will be structured by project-based Climate Adaptation Science for Threatened Landscapes research that vertically integrates and organizes learning. Communication

learning and experience will be individualized through Communication Plans and extend across the program of study. PhD students may complete their degree in 3 to 5 years; MS students will complete the program in 2 to 2.5 years. Requirements for the CAS specialization include a first-semester Colloquium (1 credit), a 2-semester Studio course (2 cr + 2 additional credits of elective short-courses each semester); a 2-part Internship, bracketing and integrated with a Studio; and an Individual Communication Plan with Capstone. Internships and the Communication Capstone are 0 credits because students will be participating in non-traditional, personalized, and experiential learning activities that will not be graded, but do need to appear on students' transcripts.

Students in the CAS specialization will be grounded in interdisciplinary climate adaptation research in their first semester of graduate school through a Colloquium will advance from presentation and discussion to formation of student groups to develop climate adaptation research problems and proposals.

An Internship-Studio cycle will immerse students in the processes of engaging, learning from, and understanding the science needs of stakeholders; collaborating to create useful and usable science-based information and products; and communicating and sharing CAS.

Each year, students will be matched to Research/Internship partners that have thematically related research needs. Several organizations will connect students to science-users that have related science needs and have offered Internship opportunities for students. These include USGS Southwest Biological Sciences Center station in Moab (USGS Moab), USGS Southwest Climate Sciences Center in Tucson (USGS SW CSC), USDA Forest Service - Rocky Mountain Research Station (USFS RMRS), and the iUTAH consortium at USU. Students will be matched to Internships according to their career and research interests and skills, relative to partners' needs.

The Studio will integrate core training in informatics, interdisciplinary research methods, risk assessment and decision-making under risk, a variety of modeling and analytical approaches, leadership and followership, and project management. Two CAS faculty will co-lead each Studio, supported by others who present on-demand short-courses or additional perspective and expertise. Students will work in small interdisciplinary groups, and parts of larger teams, to define and execute climate adaptation research on a topic that integrates the science needs of end-users and stakeholders. Each year's Studio research problem will be drawn from the science needs of Research/Internship partners and from the Internship 1 experiences of the students. The Studio will intersperse formal core training throughout the year, to give students the information and skills they need when they need them, as they form and execute their research. Core training will be delivered in short-course form, and short courses also can be taken by a broader student/stakeholder audience, not only the CAS students.

Students will navigate the full data lifecycle during the Studio from discovering hydrological, climate, ecological, and social data sets relevant to research, to integrating and preparing data for use, on through modeling and sharing results so that others can again begin the discovery process. Students will develop programming skills to automate steps, speed completion time, and improve reproducibility of work. The informatics training leverages USU investments in cyberinfrastructure storage and firmware through the NSF EPSCoR iUTAH (Horsburgh et al. 2015), NSF-CI-Water (Abdallah & Rosenberg 2014), and NSF-HydroShare (Tarboton et al. 2014) projects, as well as the Utah Climate Center's existing climate database. The informatics training will create next-generation STEM professionals who can find relevant data, use them in research for modeling and other applications, and share derived products. Formal informatics training will use existing short workshops and course modules to teach best practices in the data lifecycle. Data training will bridge the first-semester Colloquium and Studio as students locate and use data in their Studio research, becoming familiar with a variety of data types and sources.

The CAS curriculum of 9 credits fits easily within current MS and PhD degrees and includes elements that

enrich and add more individuality to students' programs. Expected CAS specialization enrollment will be 20 students each year.

Degree Map

Degree maps pertain to undergraduate programs ONLY. Provide a degree map for proposed program. Degree Maps were approved by the State Board of Regents on July 17, 2014 as a degree completion measure. Degree maps or graduation plans are a suggested semester-by-semester class schedule that includes prefix, number, title, and semester hours. For more details see <http://higheredutah.org/pdf/agendas/201407/TAB%20A%202014-7-18.pdf> (Item #3).

Please cut-and-paste the degree map or manually enter the degree map in the table below