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## Curriculum Subcommittee Agenda, March 2, 2017

Utah State University

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## Curriculum Subcommittee Agenda

2 March 2017

A meeting of the Curriculum Subcommittee of the Educational Policies Committee will be held on 2 March 2017 at 2:00 pm in Old Main 136 (Champ Hall Conference Room).

1. *Approval of 2 February 2017 Minutes* ([link](#))

2. *Program Proposals*

Request from the School of Applied Sciences, Technology and Education in the College of Agriculture and Applied Sciences to offer a Master of Aviation Science. ([link](#))

Request from the Department of Computer Science in the College of Engineering to offer a Master of Science in Data Science. ([link](#))

Request from the Department of Engineering Education in the College of Engineering to offer an On-Line Certificate in Engineering Education. ([link](#))

Request from the Department of Environment and Society in the S.J. and Jessie E. Quinney College of Natural Resources to restructure the Environmental Studies Bachelor of Science program. ([link](#))

3. *Semester Course Approval Reviews*  
<https://usu.curriculog.com/>

AG – ADVS – 2190

AG – ASTE – 6100

AG – AV – 2665

AG – AV – 2675

AG – AV – 2685

AG – AV – 3420

AG – AV – 3500

AG – AV – 3725

AG – AV – 3735

AG – ELET – 1110

AG – ELET – 1130

AG – ELET – 1140

AG – ELET – 1150

AG – ELET – 1160

AG – ELET – 1170

AG – ELET – 1180

AG – ELET – 1200

AG – ELET – 1210

AG – ELET – 2110

AG – ELET – 2120

AG – ELET – 2130

AG – ELET – 2150

AG – ELET – 2160

AG – ELET – 2210

AG – ELET – 2270  
AG – ELET – 2280  
AG – PSC – 4320  
AG – PSC – 5700  
AG – VM – 7585  
AG BU – APEC – 2010  
AR – MUSC – 2180  
AR – MUSC – 3170  
AR – ART – 1020  
AR – ART – 1120  
AR – ART – 1130  
AR – ART – 1140  
AR – ART – 2110  
AR – ART – 2200  
AR – ART – 2400  
AR – ART – 2650  
AR – ART – 2810  
AR – ART – 3610  
AR – ART – 3650  
AR – ART – 3660  
AR – ART – 3810  
CEFC – 5700  
ED – FCHD – 7300  
ED – FCHD – 7310  
ED – FCHD – 7320  
ED – NURS – 2500  
ED – SPED – 5130  
ED – SPED – 5230  
ED – SPED – 5350  
ED – SPED – 5360  
ED – SPED – 5570  
ED – SPED – 5580  
EN – CECE – 5700  
EN – CEE – 3165  
EN – CEE – 6390  
EN – CEE – 6740  
EN – ECE – 5110  
EN – ECE – 5120  
EN – CS – 4300  
EN – BENG – 5880  
HEAL – 1110  
HEAL – 1900  
HEP – 6200  
HEP – 6400  
HS – CJ – 1901  
HS – CJ – 1905  
HS – CJ – 1910  
HS – CJ – 1920  
HS – HIST – 4260  
HS – IELI – 7920  
HS – SOC – 7110  
NR – WATS – 3910

REH – 6500  
REH – 6550  
REH – 6570  
SC – BIOL – 1015  
SC – BIOL – 1615  
SC – BIOL – 1625  
SC – BIOL – 4650  
SC – CHEM – 7030  
SC – CHEM – 7330  
SC – CHEM – 7530  
SC – MATH – 4610  
SC – MATH – 5110  
SC – MATH – 5470  
SC – PHYS – 2310  
SC – PHYS – 2320  
SPED – 5105  
SPED – 5135  
SPED – 5560

*College of Agriculture and Applied Sciences*

ADVS = 2  
APEC = 1  
ASTE = 25  
LAEP =  
NDFS =  
PSC = 2

*Caine College of the Arts*

ART = 13  
MUSC = 2  
THEA =

*Jon M. Huntsman School of Business*

ACCT =  
BUS =  
ECN =  
MGT =  
MIS =

*Emma Eccles Jones College of Education and Human Services*

COMD =  
EDUC =  
FCHD = 4  
KHS = 2  
ITLS =  
NURS = 3  
PSY =  
SPED = 12  
TEAL =

***College of Engineering***

BENG = 1

CEE = 4

CS = 1

ECE = 2

EED =

MAE =

***College of Humanities and Social Sciences***

ENGL =

HIST = 1

JCOM =

LPCS =

POLS =

SSWA = 5

IELI = 1

***S.J. & Jessie E. Quinney College of Natural Resources***

ENVS =

WATS = 1

WILD =

***College of Science***

BIOL = 4

CHEM = 3

GEOL =

MATH = 3

PHYS = 2

USU =

CAS =

**4. *Other Business***

**Adjourn:**

## CURRICULUM SUBCOMMITTEE MINUTES

2 February 2017

A meeting of the Curriculum Subcommittee of the Educational Policies Committee was held on 2 February 2017 at 2:00 pm in Old Main 136 (Champ Hall Conference Room).

Present: Vijay Kannan, Chair, Jon M. Huntsman School of Business  
Brian Warnick, College of Agriculture and Applied Sciences  
Scott Hunsaker, Emma Eccles Jones College of Education and Human Services  
Michele Hillard, Secretary  
Cara Allen, Graduate Council  
Richard Mueller, College of Science  
Matt Sanders, College of Humanities and Social Sciences  
Dean Adams, College of Engineering  
Fran Hopkin, Registrar's Office  
Barbara Williams, Catalog Editor  
Ryan Bentall, USUSA Executive Vice President  
Adrienne Larson for Nicholas Morrison, Caine College of the Arts  
Claudia Radel, S.J. & Jessie E. Quinney College of Natural Resources  
Clint Pumphrey, Libraries

Absent: Scott Bates, Chair, Academic Standards  
Ty Aller, Graduate Studies Senator  
Janet Anderson, Office of the Provost  
Heidi Kesler, Registrar's Office  
Scott Henrie, USU-Eastern  
Ed Reeve, Chair, EPC  
Jessica Hansen, Academic and Instructional Services  
Nathan Straight, Regional Campuses

Visitors: N/A

### 1. Approval of 12 January 2017 Minutes

*Motion to approve the minutes of the 12 January meeting made by Ryan Bentall. Seconded by Dean Adams. Minutes approved.*

### 2. Program Proposals

Request from the Department of Computer Science in the College of Engineering to offer a Computer Science Teaching Minor.

*Motion to approve proposal pending revision made by Dean Adams. Seconded by Dick Mueller. Proposal approved pending revision.*

### 3. Semester Course Approval Reviews

#### *College of Agriculture and Applied Sciences*

*Motion to approve the business of the College of Agriculture and Applied Sciences made by Brian Warnick. Seconded by Matt Sanders. Business approved.*

ADVS = 1 (ADVS 5530 mention ADVS 6900. Cross listed with 6530 but had ADVS 3500/2200 as pre-reqs.)

APEC =

ASTE = 2

LAEP =

NDFS =

PSC =

### ***Caine College of the Arts***

ART =

MUSC =

THEA =

### ***Jon M. Huntsman School of Business***

*Motion to approve the business of the Jon M. Huntsman School of Business made by Scott Hunsaker.*

*Seconded by Dean Adams. Business approved.*

ACCT = 2

BUS =

ECN =

MGT =

MIS =

### ***Emma Eccles Jones College of Education and Human Services***

*Motion to approve the business of the Emma Eccles Jones College of Education and Human Services*

*made by Scott Hunsaker. Seconded by Dick Mueller. Business approved.*

COMD =

EDUC =

FCHD =

KHS =

ITLS =

NURS =

PSY =

SPER =

TEAL = 2

### ***College of Engineering***

*Motion to approve the business of the College of Engineering made by Dean Adams. Seconded by Brian*

*Warnick. Business approved.*

BENG = 4

CEE = 1 (CEE 3160 didn't get signatures. Will get approved at next meeting)

CS =

ECE =

EED =

MAE = 1

### ***College of Humanities and Social Sciences***

*Motion to approve the business of the College of Humanities and Social Sciences made by Matt Sanders.*

*Seconded by Dick Mueller. Business approved.*

ENGL =  
HIST = 1  
JCOM =  
LPCS = 1 (PHIL 1500 being set up as a breadth course)  
POLS =  
SSWA =

*S.J. & Jessie E. Quinney College of Natural Resources*

ENVS =  
WATS =  
WILD =

*College of Science*

BIOL =  
CHEM =  
GEOL =  
MATH =  
PHYS =

USU =  
CAS =

**4. Other Business**

Curriculog shut down – actions to be taken. Send out email/letter to departments and colleges to let them know which forms will be shut down/deleted and the timeline.

**Adjourn: 2:25 pm**



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

Institution Submitting Request: Utah State University  
 Proposed Program Title: Master of Aviation Science  
 Sponsoring School, College, or Division: College of Agriculture and Applied Sciences (CAAS)  
 Sponsoring Academic Department(s) or Unit(s): School of Applied Sciences, Technology and Education (ASTE)  
 Classification of Instructional Program Code<sup>1</sup> : 49.0104  
 Min/Max Credit Hours Required of Full Program: 33 / 33  
 Proposed Beginning Term<sup>2</sup>: Spring 2018  
 Institutional Board of Trustees' Approval Date:

**Program Type (check all that apply):**

<input type="checkbox"/> (AAS)	Associate of Applied Science Degree
<input type="checkbox"/> (AA)	Associate of Arts Degree
<input type="checkbox"/> (AS)	Associate of Science Degree
<input type="checkbox"/>	Specialized Associate Degree (specify award type <sup>3</sup> : )
<input type="checkbox"/>	Other (specify award type <sup>3</sup> : )
<input type="checkbox"/> (BA)	Bachelor of Arts Degree
<input type="checkbox"/> (BS)	Bachelor of Science Degree
<input type="checkbox"/>	Specialized Bachelor Degree (specify award type <sup>3</sup> : )
<input type="checkbox"/>	Other (specify award type <sup>3</sup> : )
<input type="checkbox"/> (MA)	Master of Arts Degree
<input type="checkbox"/> (MS)	Master of Science Degree
<input type="checkbox"/>	Specialized Master Degree (specify award type <sup>3</sup> : )
<input checked="" type="checkbox"/>	Other (specify award type <sup>3</sup> : Master of Aviation Science )
<input type="checkbox"/>	Doctoral Degree (specify award type <sup>3</sup> : )
<input type="checkbox"/>	K-12 School Personnel Program
<input type="checkbox"/>	Out of Service Area Delivery Program

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

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

<sup>3</sup> Please indicate award such as APE, BFA, MBA, MEd, EdD, JD

**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.

Please type your first and last name \_\_\_\_\_ Date:

I understand that checking this box constitutes my legal signature.

# Utah System of Higher Education Program Description - Full Template

## Section I: The Request

Utah State University requests approval to offer the following Master's degree(s): Master of Aviation Science effective Spring 2018. This program was approved by the institutional Board of Trustees on .

## Section II: Program Proposal

### Program Description

*Present a complete, formal program description.*

The School of Applied Sciences, Technology, and Education recommends a new program at the master's level in Aviation Science. This degree will stack a new degree above the existing Bachelor of Science degree in Aviation Technology. The new Master of Aviation Science (MAS) program will build on the existing aviation curriculum and provide opportunities for professionals in the aviation industry. The program will be an online degree, focusing on Aviation Safety, that will complement the existing master's programs in ASTE. The program will require students to complete four core courses (12 credits), six credits in their applied research/demonstration project, three courses (9 credits) in their focus area, and two courses (6 credits) of electives. The 33 credit program mirrors the existing Technology Engineering Education Master's degree, and the on-line Career and Technical Education MEd degree in ASTE. There have been several aviation students who have completed their master's degree in TEE, with a focus in Aviation Technology and this experience has been used to guide this request. This program will bring a new degree with potential interest for industry professionals, and others with academic backgrounds/training in aviation. Aviation safety is a highly desired and sought after specialty in corporate, commercial and general aviation. Aviation business and management personnel, as well as pilots and maintenance professionals will have interest in this degree.

### Consistency with Institutional Mission

*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/policy312/](http://higheredutah.org/policies/policy312/).*

The Mission Statement of USU includes specific statements on learning, discovery and engagement. The overall mission statement of Utah schools includes emphasis on local, state and national levels, which an online program is designed to help. As USU graduates, and those of other institutions, enter the workforce, there is often a need to expand skills, knowledge and abilities, to prepare them for increased service, employment and development.

There is an effort to expand the degree opportunities for students through online degrees. Whereas the Bachelor's level Aviation Technology degree requires class time and flight time to be logged with an instructor by the Federal Aviation Administration (FAA), the master's degree can be delivered 100% online. Faculty and staff can teach from anywhere as the students take the courses from anywhere. This degree will meet the challenge to "discover, create and transmit knowledge through education and training programs" not only at the undergraduate level, but "graduate and professional levels" as specified in the Utah State University mission statement. This proposal will strengthen USU's status in the nation as a top tier aviation program, and place us amongst the leading institutions that currently offer master's degrees. This online program is consistent with the goals of growth and economic development, as there is no infrastructure (classroom) requirements, and the market is a global audience.

## Section III: Needs Assessment

### Program Rationale

*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.*

Faculty and staff in the Aviation Technology program researched the need for a program to advance professionals in the aviation industry. While traveling to national conferences and meeting with industry professionals, the desire for aviation

professionals--both pilots and maintenance individuals--to have a master's degree was clear. This online degree will enable professionals in the industry to take courses while maintaining a variable work schedule that is common in the aviation industry.

The department has applicable experience through working with aviation professionals in the Technology and Engineering Education M.S. degree program. Student interest and faculty commitment to developing online resources to enhance course offerings provide a solid foundation for this proposal. As new courses are developed and enrollment increases, additional instructors can then be hired, possibly as adjuncts, with the ability to teach from anywhere, or the aviation program will be able to expand the resident faculty to assume the load. USU and USHE will then be one of a select group of universities to offer a 100% online master's degree in the aviation discipline.

## 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](http://jobs.utah.gov/jsp/wi/utalmis/gotoOccinfo.do)) and the Occupation Outlook Handbook ([www.bls.gov/oco](http://www.bls.gov/oco)).*

According to the 2016-17 Occupational Outlook Handbook, "employment for commercial pilots is projected to grow 10% from 2014 to 2024, faster than the average for all occupations." The median pay for airline and commercial pilots in 2015 was \$102,520. The aviation industry is robust and job opportunities will continue as commercial pilots reach the mandatory retirement age of 65. The competition for careers at major airlines is strong. Although a graduate degree is not required for advancement in the industry, the attainment of an advanced degree provides a strong indicator of a candidate's commitment to currency and self-initiated development that is a hallmark of the industry. As the aviation industry continues to grow, there is an ever increasing need for management professionals with advanced degrees. The current market demonstrates nearly a 100% job placement rate for aviation graduates, and many alumni and industry professionals are seeking out opportunities for higher education.

## Student Demand

*Provide evidence of student interest and demand that supports potential program enrollment. Use Appendix D to project five years' enrollments and graduates. Note: If the proposed program is an expansion of an existing program, present several years enrollment trends by headcount and/or by student credit hours that justify expansion.*

An informal interest survey conducted in the spring of 2016 within the USU graduating class revealed that over 50% of graduates will be interested in pursuing an advanced degree at some time in their career. At the fall 2016 USU Aviation Advisory Committee Meeting, every airline and maintenance organization represented expressed an interest in this proposed degree, as many mid-level career professionals are interested in advanced education to assist them in their career paths. While not required for the major airlines, many recruiters reflect a desire and need for aviation professionals with a master's degree demonstrating currency of education. It is anticipated that this program will attract 10-15 students in the first year of approval and, with a marketing campaign at the national level, the enrollment will show steady consistent growth with our target enrollment in the program of 60 students.

## Similar Programs

*Are similar programs offered elsewhere in the USHE, the state, or Intermountain Region? If yes, identify the existing program(s) and cite justifications for why the Regents should approve another program of this type. How does the proposed program differ from or compliment similar program(s)?*

There are no aviation master's degrees in Utah, Wyoming, Idaho, Nevada or Colorado. Arizona has Embry-Riddle Aeronautical University (a private institution), with master's and doctoral degrees in aviation. There are Aerospace Engineering and similar degrees at USU, University of Utah and other Colorado schools, but none for aviation professionals that are not engineers. This new program is designed for aviation professionals that are pilots, dispatchers, airport managers, maintenance technicians, business managers and military aviators. The Master of Aviation Science degree will complement our current Bachelor of Science Degree in Aviation Technology.

## Collaboration with and Impact on Other USHE Institutions

*Indicate if the program will be delivered outside of designated service area; provide justification. Service areas are defined in [higheredutah.org/policies/policyr315/](http://higheredutah.org/policies/policyr315/). Assess the impact the new program will have on other USHE institutions. Describe any discussions with other institutions pertaining to this program. Include any collaborative efforts that may have been proposed.*

Because this is an online degree, a graduate of any USHE institution with a bachelor's degree will be eligible to apply with the target audience being those in the commercial aviation industry. This program will be available to anyone in the world. Aviation faculty members have spoken with other institution faculty members, including Embry-Riddle Aeronautical University and California Baptist University to identify positive academic alignment and avoid pitfalls they have experienced.

## External Review and Accreditation

*Indicate whether external consultants or, for a career and technical education program, program advisory committee were involved in the development of the proposed program. List the members of the external consultants or advisory committee and briefly describe their activities. If the program will seek special professional accreditation, project anticipated costs and a date for accreditation review.*

The USU Aviation advisory committee consists of industry partners, including: SkyWest Airlines, Envoy, Republic Airways, Trans States Airlines, Duncan Aviation, Mesa, Delta, Air Wisconsin, Endeavor Air, GoJet Airlines, Comutair (United Express), and Western Aircraft. The Utah State University Aviation Advisory Committee was consulted about this new program, (Master of Aviation Science) and they indicated that aviation safety is an appropriate consistent foundational theme. The advisory committee members were all interested in, and offered encouragement and advice for the program development. The group also stated that Maintenance Management would be an area that would be in demand; however, USU does not currently have faculty to support this focus. There is no specific accreditation required for this new master's degree.

## Section IV: Program Details

### Graduation Standards and Number of Credits

*Provide graduation standards. Provide justification if number of credit or clock hours exceeds credit limit for this program type described in R401-3.11, which can be found at [higheredutah.org/policies/R401](http://higheredutah.org/policies/R401).*

The Master of Aviation Science will require 33 credits in 11 courses. This is standard for other master's programs at USU, and modeled after the existing TEE Master's degree. Students will complete a course in research development followed by a creative/applied research project. No residency is required in this online degree program.

### Admission Requirements

*List admission requirements specific to the proposed program.*

Admission requirements will mirror current master's degrees in the graduate school and ASTE. Students will complete the online application, complete with the current GRE or MAT exam, letters and transcripts. The only additional requirement will be aviation experience or background. This may be accomplished by one of the following: Aviation Degree, Aviation Certifications (e.g. pilot's license, FAA certification as an aircraft mechanic--Airframe & Powerplant (A&P) license) or other aviation employment /experience.

### Curriculum and Degree Map

*Use the tables in Appendix A to provide a list of courses and Appendix B to provide a program Degree Map, also referred to as a graduation plan.*

## Section V: Institution, Faculty, and Staff Support

### Institutional Readiness

*How do existing administrative structures support the proposed program? Identify new organizational structures that may be needed to deliver the program. Will the proposed program impact the delivery of undergraduate and/or lower-division education? If yes, how?*

There are four Aviation faculty members with master's degrees, and industry experience, who are responsible for the content and instruction of the AV online courses. USU's CIDI (Center for Innovative Design and Instruction) has helped develop the courses which are currently being taught within the Technology and Engineering Education Master of Science degree program as needed. Additional faculty expertise may be needed as the program grows and course offerings expand. There has been no degradation of any undergraduate programs or courses. As this program is 100% online, there is no additional classroom infrastructure required. The current CANVAS LMS and web-based applications have proven excellent for course presentation. The online course offering, including the online Career and Technical Education (CTE) Master of Education degree, within ASTE, demonstrates the capability and capacity to develop and deliver this new program.

## Faculty

*Describe faculty development activities that will support this program. Will existing faculty/instructors, including teaching/graduate assistants, be sufficient to instruct the program or will additional faculty be recruited? If needed, provide plans and resources to secure qualified faculty. Use Appendix C to provide detail on faculty profiles and new hires.*

Current faculty, primarily in the Aviation Technology, and the Technology and Engineering Education programs in ASTE, have the expertise to oversee and develop the program. Current faculty members have participated in professional development opportunities, including the Empowering Teaching Excellence seminars, workshops and development programs at USU-- especially the online and distance education focused courses.

## Staff

*Describe the staff development activities that will support this program. Will existing staff such as administrative, secretarial/ clerical, laboratory aides, advisors, be sufficient to support the program or will additional staff need to be hired? Provide plans and resources to secure qualified staff, as needed.*

Current staff is available to manage the students when supplemented by other ASTE faculty. The day-to-day activities will be incorporated into ASTE's existing infrastructure that supports graduate programs. The student program development and mentoring will also use the existing programming guidelines set for by the School of Graduate Studies at USU.

## Student Advisement

*Describe how students in the proposed program will be advised.*

Students will be advised initially by the Professional Pilot Program Director. The faculty from ASTE can provide additional support in advising and mentoring. The current faculty have experience in working with online graduate students and will integrate best practices for working with students at a distance.

## Library and Information Resources

*Describe library resources required to offer the proposed program if any. List new library resources to be acquired.*

The current support of the library with online capabilities will be an excellent resource for students in the Master of Aviation Science program. The USU library currently provides the Aviation Technology undergraduate programs with adequate library resources. Current aviation related resources, coupled with the resources available to TEE MS and CTE MEd degree programs will provide adequate library resources for this new degree program. No new requirements are foreseen at this time.

## Projected Enrollment and Finance

*Use Appendix D to provide projected enrollment and information on related operating expenses and funding sources.*

# Section VI: Program Evaluation

## Program Assessment

*Identify program goals. Describe the system of assessment to be used to evaluate and develop the program.*

The degree aims to expand the reach of the Aviation Technology program across the United States and world, not just in Utah. However, the goal is to become the premier school for aviation in the Mountain West, and offering this online degree helps to reach this objective. Additionally, the program aims to develop students who are prepared for advancement with the aviation

related professions. Students will be prepared to provide leadership in aviation careers, ready to think broadly and deeply and to advance within their field. Students will be evaluated on their ability to reflect and think about challenges in aviation, and how to bring the latest technologies to improve the safety and security of aviation. The department will continue to use a holistic approach to program assessment and improvements.

### **Student Standards of Performance**

*List the standards, competencies, and marketable skills students will have achieved at the time of graduation. How and why were these standards and competencies chosen? Include formative and summative assessment measures to be used to determine student learning outcomes.*

Graduates will be able to articulate the impact of aviation on the economic and social aspects of society. They will be able to relate specifics of the airline system, general aviation and modern technology as it applies to their role as a leader and manager. Students will be evaluated on their ability to write and research on a specific project, either related to their current field or in view of a new or expanded role. Students will be able to relate the history of aviation safety, and emerging efforts to continue to improve aviation safety.

## Appendix A: 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 be awarded the degree.

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

		Course Number	NEW Course	Course Title	Credit Hours
General Education Courses (list specific courses if recommended for this program on Degree Map)					
<b>General Education Credit Hour Sub-Total</b>					
Required Courses					
<input type="radio"/>	<input type="radio"/>	AV 6110		The Air Transportation System	3
<input type="radio"/>	<input type="radio"/>	AV 6120		Aviation Operations and Management	3
<input type="radio"/>	<input type="radio"/>	AV 6140		Aviation Safety: History and Research	3
<input type="radio"/>	<input type="radio"/>	AV 6310		Aviation Safety Management Systems	3
<input type="radio"/>	<input type="radio"/>	AV 6320		Airport and Ground Safety Programs	3
<input type="radio"/>	<input type="radio"/>	AV 6330		Flight Safety Program Management	3
<input type="radio"/>	<input type="radio"/>	TEE 6960		Master's Project	3
<input type="radio"/>	<input type="radio"/>				
<input type="radio"/>	<input type="radio"/>				
Choose 1 of the following courses:					
<input type="radio"/>	<input type="radio"/>	ASTE 6100		Research Methods	3
<input type="radio"/>	<input type="radio"/>	ASTE 6170		Reading and Applying Research	3
<input type="radio"/>	<input type="radio"/>				
<b>Required Course Credit Hour Sub-Total</b>					24
Elective Courses					
<input type="radio"/>	<input type="radio"/>			Choose 3 of the following courses:	
<input type="radio"/>	<input type="radio"/>	AV 6340	X	Aviation Accident Investigation and Analysis	3
<input type="radio"/>	<input type="radio"/>	AV 6900		Aviation Independent Study	3
<input type="radio"/>	<input type="radio"/>	AV 6930		Aviation Special Topics	3
<input type="radio"/>	<input type="radio"/>	ASTE 6180		Program Planning & Evaluation	3
<input type="radio"/>	<input type="radio"/>	ASTE 6350		Safety and Risk Management for CTE	3
<input type="radio"/>	<input type="radio"/>	ASTE 7500		Diffusions of Innovations	3
<input type="radio"/>	<input type="radio"/>	TEE 6520		Explorations of Industry	3
<input type="radio"/>	<input type="radio"/>	TEE 6900		Readings and Conference	3
<b>Elective Credit Hour Sub-Total</b>					9
<b>Core Curriculum Credit Hour Sub-Total</b>					33



## **Program Curriculum Narrative**

*Describe any variable credits. You may also include additional curriculum information.*

The program will not require a cohort approach. Students may start any semester and take courses in any order, except the Research Methods course must be taken prior to the capstone project course.

## **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.*

## Appendix C: Current and New Faculty / Staff Information

### Part I. Department Faculty / Staff

Identify # of department faculty / staff (headcount) for the year preceding implementation of proposed program.

	# Tenured	# Tenure -Track	# Non -Tenure Track
Faculty: Full Time with Doctorate	11	5	1
Faculty: Part Time with Doctorate	1		
Faculty: Full Time with Masters	4	1	5
Faculty: Part Time with Masters			
Faculty: Full Time with Baccalaureate	4	3	10
Faculty: Part Time with Baccalaureate			
Teaching / Graduate Assistants	/ / / / /	/ / / / /	2
Staff: Full Time			11
Staff: Part Time			7

### Part II. Proposed Program Faculty Profiles

List current faculty within the institution -- with academic qualifications -- to be used in support of the proposed program(s).

	First Name	Last Name	Tenure (T) / Tenure Track (TT) / Other	Degree	Institution where Credential was Earned	Est. % of time faculty member will dedicate to proposed program.	If "Other," describe
Full Time Faculty							
	Andreas	Wesemann	Other	MAS	Embry-Riddle Aeronautical University	20%	Pro Practice
	Frank	Manderino	Other	MS	Delta State University	20%	Pro Practice
	Matt	Bunnell	Other	MS	USU	20%	Asst Chief P
	Aaron	Dyches	Other	MS	USU	10%	Chief Flight
	Debra	Spielmaker	T	PhD	USU	10%	
	Ed	Reeve	T	PhD	Ohio State University	5%	
	Gary	Stewardson	T	PhD	University of Maryland	5%	
	Michael	Pate	T	PhD	Iowa State University	5%	
	Brian	Warnick	T	PhD	Oregon State University	5%	
	Tyson	Sorenson	TT	PhD	Oregon State University	5%	
	Bruce	Miller	T	PhD	Iowa State University	5%	

### Part Time Faculty


### Part III: New Faculty / Staff Projections for Proposed Program

Indicate the number of faculty / staff to be hired in the first three years of the program, if applicable. Include additional cost for these faculty / staff members in Appendix D.

	# Tenured	# Tenure -Track	# Non -Tenure Track	Academic or Industry Credentials Needed	Est. % of time to be dedicated to proposed program.
Faculty: Full Time with Doctorate					
Faculty: Part Time with Doctorate					
Faculty: Full Time with Masters					
Faculty: Part Time with Masters					
Faculty: Full Time with Baccalaureate					
Faculty: Part Time with Baccalaureate					
Teaching / Graduate Assistants					
Staff: Full Time					
Staff: Part Time					

## Appendix D: Projected Program Participation and Finance

### Part I.

*Project the number of students who will be attracted to the proposed program as well as increased expenses, if any. Include new faculty & staff as described in Appendix C.*

Three Year Projection: Program Participation and Department Budget						
	Year Preceding Implementation	New Program				
		Year 1	Year 2	Year 3	Year 4	Year 5
<b>Student Data</b>						
# of Majors in Department	953					
# of Majors in Proposed Program(s)	////	12	20	30	45	60
# of Graduates from Department	154	154	164	172	180	180
# Graduates in New Program(s)	////	0	10	18	26	26
<b>Department Financial Data</b>						
<i>Project additional expenses associated with offering new program(s). Account for New Faculty as stated in Appendix C, "Faculty Projections."</i>	Department Budget					
	Year Preceding Implementation (Base Budget)	Year 1	Year 2	Year 3		
		Addition to Base Budget for New Program(s)	Addition to Base Budget for New Program(s)	Addition to Base Budget for New Program(s)		
<b>EXPENSES – nature of additional costs required for proposed program(s)</b>						
<i>List salary benefits for additional faculty/staff each year the positions will be filled. For example, if hiring faculty in year 2, include expense in years 2 and 3. List one-time operating expenses only in the year expended.</i>						
Personnel (Faculty & Staff Salary & Benefits)	\$2,041,467	\$51,036	\$52,312	\$53,620		
Operating Expenses (equipment, travel, resources)	\$121,333	\$5,000	\$5,000	\$5,000		
Other:						
<b>TOTAL PROGRAM EXPENSES</b>	////	\$56,036	\$57,312	\$58,620		
<b>TOTAL EXPENSES</b>	\$2,162,800	\$2,218,836	\$2,220,112	\$2,221,420		
<b>FUNDING – source of funding to cover additional costs generated by proposed program(s)</b>						
<i>Describe internal reallocation using Narrative 1 on the following page. Describe new sources of funding using Narrative 2.</i>						
Internal Reallocation	\$2,162,800	\$56,036	\$57,312	\$58,620		
Appropriation						
Special Legislative Appropriation						
Grants and Contracts						
Special Fees						
Tuition						
Differential Tuition (requires Regents approval)						
<b>PROPOSED PROGRAM FUNDING</b>	////	\$56,036	\$57,312	\$58,620		
<b>TOTAL DEPARTMENT FUNDING</b>	\$2,162,800	\$2,218,836	\$2,220,112	\$2,221,420		
<b>Difference</b>						
Funding - Expense	\$0	\$0	\$0	\$0		

## Part II: Expense explanation

### Expense Narrative

*Describe expenses associated with the proposed program.*

Program expenses are being directed from the progressive, thoughtful program growth as guided by student, faculty, and industry input.

## Part III: Describe funding sources

### Revenue Narrative 1

*Describe what internal reallocations, if applicable, are available and any impact to existing programs or services.*

ASTE has no additional line revenue streams that have been committed to this program. The primary revenue that can be directed towards this program will come through funding generated internally based upon the graduate program SCH return. The ASTE faculty are committed to steady program growth and enhancement.

### Revenue Narrative 2

*Describe new funding sources and plans to acquire the funds.*

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

Institution Submitting Request: Utah State University  
 Proposed Program Title: Masters of Science in Data Science  
 Sponsoring School, College, or Division: College of Engineering  
 Sponsoring Academic Department(s) or Unit(s): Computer Science  
 Classification of Instructional Program Code<sup>1</sup> : 11.0701, 14.0903  
 Min/Max Credit Hours Required of Full Program: 30 / 30  
 Proposed Beginning Term<sup>2</sup>: Fall 2017  
 Institutional Board of Trustees' Approval Date:

**Program Type (check all that apply):**

<input type="checkbox"/>	(AAS) Associate of Applied Science Degree
<input type="checkbox"/>	(AA) Associate of Arts Degree
<input type="checkbox"/>	(AS) Associate of Science Degree
<input type="checkbox"/>	Specialized Associate Degree (specify award type <sup>3</sup> : )
<input type="checkbox"/>	Other (specify award type <sup>3</sup> : )
<input type="checkbox"/>	(BA) Bachelor of Arts Degree
<input type="checkbox"/>	(BS) Bachelor of Science Degree
<input type="checkbox"/>	Specialized Bachelor Degree (specify award type <sup>3</sup> : )
<input type="checkbox"/>	Other (specify award type <sup>3</sup> : )
<input type="checkbox"/>	(MA) Master of Arts Degree
<input checked="" type="checkbox"/>	(MS) Master of Science Degree
<input type="checkbox"/>	Specialized Master Degree (specify award type <sup>3</sup> : )
<input type="checkbox"/>	Other (specify award type <sup>3</sup> : )
<input type="checkbox"/>	Doctoral Degree (specify award type <sup>3</sup> : )
<input type="checkbox"/>	K-12 School Personnel Program
<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.

\_\_\_\_\_ Date:

I understand that checking this box constitutes my legal signature.

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

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

<sup>3</sup> Please indicate award such as APE, BFA, MBA, MEd, EdD, JD

# Utah System of Higher Education Program Description - Full Template

## Section I: The Request

Utah State University requests approval to offer the following Master's degree(s): Masters of Science in Data Science effective Fall 2017. This program was approved by the institutional Board of Trustees on .

## Section II: Program Proposal

### Program Description

*Present a complete, formal program description.*

Academic and industry researchers are increasingly using data-driven methods to build models of complex systems for forecasting, prediction, risk management, or strategic decision-making. As evidence of a trend in research, in 2012, the White House announced the first "Big Data Research and Development Initiative" spanning NSF, DoD, NIH, DARPA, DoE, and USGS. As summarized by one report from the White House Big Data Initiative, this need is becoming more acute "as the collection, storage, and analysis of data continues on an upward and seemingly boundless trajectory, fueled by increases in processing power, the cratering costs of computation and storage, and growing number of sensor technologies embedded in devices of all kinds." see Big Data: Seizing Opportunities, Preserving Values. In 2011 a McKinsey report estimated there would be 140,000 to 190,000 unfilled positions of U.S. data science and analytics experts by 2018. For companies like Google, Facebook, LinkedIn, Amazon, and Walmart data science is becoming integrated into their business models. They are investing heavily in large-scale data analytics and the software needed extract information from massive datasets.

The current shortage of data scientists reflects the relatively broad skills required by potential employers, both in research and industry. This motivates the underlying objectives of our program: to prepare our students through cross-disciplinary training to develop innovative software solutions that improve the efficiency and scope of data science tools. Students obtaining a Masters of Science in Data Science will be able to:

1. Develop innovative software solutions that improve the efficiency and scope of data science tools;
2. Apply existing programming tools, languages, and algorithms to build, clean and process large datasets as efficiently as possible;
3. Understand how to successfully work with multidisciplinary teams to identify and construct computational solutions to solve problems from a diversity of domains within Utah industries and departments and research centers throughout USU;
4. Understand how to expand the functionality of state-of-the-art high-performance data science software.

Students completing the Master of Data Science program will thus be prepared to compete in the modern job market. USU currently has no MS degree in Data Science. To satisfy the needs of students, prospective employers, and communities, the CS department proposes to offer a Master of Science in Data Science, offered as a Plan A MS degree only.

In our proposed Data Science degree program, students will satisfy following conditions to graduate:

- Take at least 30 credits in total
- Take at least five core Computer Science or Statistics courses. Among the five courses, at least three courses should be 6000 level
- Actively participate in a new Incubator course that brings together CS data science students with students from across campus working on applied data science research.
- Take six research credits
- Additional multidisciplinary courses under their major professor's approval



## Consistency with Institutional Mission

*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/policy312/](http://higheredutah.org/policies/policy312/).*

The mission of Utah State University is to be one of the nation's premier student-centered land grant and space grant universities by fostering the principle that academics come first; by cultivating diversity of thought and culture; and by serving the public through learning, discovery, and engagement. The Masters of Science in Computer Science program proposed here will advance these objectives, not only within the Computer Science Department, but throughout the University and across Utah. Students trained under this program will gain valuable skills that are in high demand and contribute to the growing high-tech economy in Utah, particularly across the Wasatch front. This year, the university has begun a "big data" initiative with new faculty lines introduced across several colleges, including Education, Natural Resources, Business, Ag, Science, and Engineering. Computer Science will play a pivotal role in this effort because computer scientists research, design and implement the software and algorithms that make these "big data" systems work.

## Section III: Needs Assessment

### Program Rationale

*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.*

A new Masters of Science program is required to satisfy the rapid growth in the demand for computer scientists who specialize in data science. A new MS program is required, rather than a limited expansion of our existing general computer science MS because data science requires a distinct program of courses due to its multidisciplinary nature and extensive set of computer science skills required. The Computer Science department has laid the groundwork for this initiative over the last three years with two new faculty hires in data science, machine learning and data mining. This new Masters of Science program will help unify research efforts across campus and complement the new Data Analytics program in Statistics and Business.

### 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](http://jobs.utah.gov/jsp/wi/utalmis/gotoOccinfo.do)) and the Occupation Outlook Handbook ([www.bls.gov/oco](http://www.bls.gov/oco)).*

There is a significant imbalance between the supply and the demand for Data Scientists. Glassdoor report ([www.glassdoor.com](http://www.glassdoor.com)) ranks Data Scientist job as the "Best Job in America for 2016" based on career opportunities rating, the number of open data science jobs and average salaries earned by data scientists. According to this site, the nationwide average Data Scientist earns \$113,000 compared to \$63,500 for the average software engineer. The *McKinsey Global Institute* estimates that by 2018 the U.S will need an additional 140,000 to 190,000 with data science skills. Both Bloomberg Businessweek (see [Help Wanted: Black Belts in Data](#)) and the Wall Street Journal ([New Report Puts Numbers on Data Scientist Trend](#)) have more recently reported starting salaries for well-qualified data scientists in excess of \$200K [As Tech Booms, Workers Turn to Coding for Career Change](#). Bloomberg additionally cites summer internships for students that are currently paying \$6000-\$10000 per month.

### Student Demand

*Provide evidence of student interest and demand that supports potential program enrollment. Use Appendix D to project five years' enrollments and graduates. Note: If the proposed program is an expansion of an existing program, present several years enrollment trends by headcount and/or by student credit hours that justify expansion.*

The classes offered in our graduate program with a Data Science emphasis have the highest enrollment compared to other classes. These include CS 5800: Databases - 56 students, CS 6800: Advanced databases - 60 students, CS 5665: Introduction to Data Science - 32 students, and CS 6675: Advance Data Science and Mining - 23 students. Based on the

market research quoted above, a high student demand is anticipated for this program.

### Similar Programs

*Are similar programs offered elsewhere in the USHE, the state, or Intermountain Region? If yes, identify the existing program(s) and cite justifications for why the Regents should approve another program of this type. How does the proposed program differ from or compliment similar program(s)?*

Similar programs

In 2014 University of Utah initiated a "big data certificate" offered by the Computing Department. The certificate requires students to take five core classes in Advanced Algorithms, Database Systems, Data Mining, Machine Learning and Visualization. The department now offers a Big Data Masters (MS in Computing) and a Big Data Ph.D. (Ph.D. in Computing) (<http://www.cs.utah.edu/bigdata/>). The MS program extends the certificate requirements for plan A specialization to include three electives and a thesis. The Ph.D. requires a Ph.D. dissertation.

The proposed Data Science program will complements UoU's program by taking a multidisciplinary approach where data science faculty from other departments (strengthened by the cluster hire process) work directly with CS faculty and students to develop solutions to real problems, facilitated by the new incubator course. This applied approach fits well with USU's land-grant mission.

### Collaboration with and Impact on Other USHE Institutions

*Indicate if the program will be delivered outside of designated service area; provide justification. Service areas are defined in [higheredutah.org/policies/policy315/](http://higheredutah.org/policies/policy315/). Assess the impact the new program will have on other USHE institutions. Describe any discussions with other institutions pertaining to this program. Include any collaborative efforts that may have been proposed.*

The proposed Data Science program will not be delivered outside of the designated service area, and due to the multidisciplinary approach and the magnitude of the target population, should not have an adverse impact on other USHE institutions. It is anticipated that many of the program participants will come from other closely-related and application-specific fields.

### External Review and Accreditation

*Indicate whether external consultants or, for a career and technical education program, program advisory committee were involved in the development of the proposed program. List the members of the external consultants or advisory committee and briefly describe their activities. If the program will seek special professional accreditation, project anticipated costs and a date for accreditation review.*

There are no accreditation requirements for this program. However, the CS departments industrial advisory board will periodically evaluate the curriculum and student success.

## Section IV: Program Details

### Graduation Standards and Number of Credits

*Provide graduation standards. Provide justification if number of credit or clock hours exceeds credit limit for this program type described in R401-3.11, which can be found at [higheredutah.org/policies/R401](http://higheredutah.org/policies/R401).*

Students must complete 30 credit hours as detailed below in Appendix A. All students will complete a Plan A and are required to complete a Thesis that will be reviewed by their committee.

## Admission Requirements

*List admission requirements specific to the proposed program.*

A bachelors degree in Computer Science or closely related field. Coursework in basic Statistics (equivalent to STAT 3000).

## Curriculum and Degree Map

*Use the tables in Appendix A to provide a list of courses and Appendix B to provide a program Degree Map, also referred to as a graduation plan.*

## Section V: Institution, Faculty, and Staff Support

### Institutional Readiness

*How do existing administrative structures support the proposed program? Identify new organizational structures that may be needed to deliver the program. Will the proposed program impact the delivery of undergraduate and/or lower-division education? If yes, how?*

The department's graduate program's organization is well positioned to handle the extra administrative load this new program will entail. Currently, the Associate Department Head oversees the graduate program of approximately 60 MS students and 25 PhD students. This faculty oversight will be sufficient to cover the administration during initial growth of this new program, although we anticipate requiring an additional administrative assistant to better manage the day-to-day operations as the program grows. The undergraduate program is experiencing rapid growth and has recently hired two new instructors to teach undergraduate courses full time to cover the extra classes required. No adverse effects on the quality of our undergraduate program due to this new MS are anticipated. Indeed, it is expected that the addition of 5000 level classes in data science related topics will improve the readiness of our graduating undergraduate students.

### Faculty

*Describe faculty development activities that will support this program. Will existing faculty/instructors, including teaching/graduate assistants, be sufficient to instruct the program or will additional faculty be recruited? If needed, provide plans and resources to secure qualified faculty. Use Appendix C to provide detail on faculty profiles and new hires.*

Two CS faculty members have developed and offered four graduate courses in data science: CS 5800: Databases, CS 6800: Advanced databases, CS 5665: Introduction to Data Science, and CS 6675: Advance Data Science and Mining. Two other faculty members have offered to teach our newly proposed classes CS 6895: Special Topics in Data Science and CS 5830/6830: Data Science Incubator. The CS department plan to hire one new faculty members by 2017 summer so that they can teach CS 6665: Data Mining, CS 6895: Special Topics in Data Science, along with relevant new courses they may create. Additionally, the department is committed to hiring an additional teaching faculty for existing undergrad courses, freeing up teaching duties for research faculty needed to teach the new grad courses. Teaching assistants will be provided as needed, funded completely or in part by the differential tuition generated by the courses themselves.

### Staff

*Describe the staff development activities that will support this program. Will existing staff such as administrative, secretarial/clerical, laboratory aides, advisors, be sufficient to support the program or will additional staff need to be hired? Provide plans and resources to secure qualified staff, as needed.*

No additional staff will be required for this program.

### **Student Advisement**

*Describe how students in the proposed program will be advised.*

Students in the new program will be advised by their major professor and committee.

### **Library and Information Resources**

*Describe library resources required to offer the proposed program if any. List new library resources to be acquired.*

No additional library and information resources will be required. Existing library resources plus those available on the web are sufficient to fully support the program.

### **Projected Enrollment and Finance**

*Use Appendix D to provide projected enrollment and information on related operating expenses and funding sources.*

## **Section VI: Program Evaluation**

### **Program Assessment**

*Identify program goals. Describe the system of assessment to be used to evaluate and develop the program.*

### **Student Standards of Performance**

*List the standards, competencies, and marketable skills students will have achieved at the time of graduation. How and why were these standards and competencies chosen? Include formative and summative assessment measures to be used to determine student learning outcomes.*

## Appendix A: 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 be awarded the degree.

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

		Course Number	NEW Course	Course Title	Credit Hours
General Education Courses (list specific courses if recommended for this program on Degree Map)					
					<b>General Education Credit Hour Sub-Total</b>
Required Courses					
<input type="radio"/>	<input type="radio"/>	CS 5800		Databases	3
<input type="radio"/>	<input type="radio"/>	CS 6800		Advanced databases	3
<input type="radio"/>	<input type="radio"/>	CS 6665		Data Mining	3
<input type="radio"/>	<input type="radio"/>	CS 5665		Introduction to Data Science	3
<input type="radio"/>	<input type="radio"/>	CS 6675		Advanced Data Science and Mining	3
<input type="radio"/>	<input type="radio"/>	CS 5830/6830	X	Data Science Incubator	3
<input type="radio"/>	<input type="radio"/>	CS 6970		Thesis	6
<input type="radio"/>	<input type="radio"/>				
<input type="radio"/>	<input type="radio"/>				
<input type="radio"/>	<input type="radio"/>				
					<b>Required Course Credit Hour Sub-Total</b>
					24
Elective Courses					
<input type="radio"/>	<input type="radio"/>	CS 6895	X	Special Topics in Data Science	3
<input type="radio"/>	<input type="radio"/>	MIS 6230		Management of Database Systems	3
<input type="radio"/>	<input type="radio"/>	MIS 6330		Database Implementation	3
<input type="radio"/>	<input type="radio"/>	PSC 6123		Climate Data Analysis	3
<input type="radio"/>	<input type="radio"/>	STAT 5810		Introduction to Statistical Computing	3
<input type="radio"/>	<input type="radio"/>	STAT 6550		Graphical Methods	3
<input type="radio"/>	<input type="radio"/>	STAT 6650		Stat Learning: Multivariate Stat Analysis for Bioinformatics, Data	3
<input type="radio"/>	<input type="radio"/>	MIS 5350		Data Modeling and Analytics	3
<input type="radio"/>	<input type="radio"/>	CS 6970		Internship	3
<input type="radio"/>	<input type="radio"/>	CS 6600		Advanced Machine Intelligence	3
<input type="radio"/>	<input type="radio"/>			(students will select two from the above list)	
Choose _____ of the following courses:					
<input type="radio"/>	<input type="radio"/>				
<input type="radio"/>	<input type="radio"/>				
					<b>Elective Credit Hour Sub-Total</b>
					6
					<b>Core Curriculum Credit Hour Sub-Total</b>
					30

## Program Curriculum Narrative

*Describe any variable credits. You may also include additional curriculum information.*

This Plan A program includes 18 hours of core computer science courses that provide the necessary skill set for a data scientist in computer science. CS 5800 and CS 6800 courses cover large data storage and management methods in databases; CS 5665 and CS 6665 include state-of-the-art algorithms and methodologies and their implementation in class projects; CS 6830 applies the "business incubator" model employed in industry and aims to give students real-world experience in working with domain experts to produce proof-of-concept data science applications. This class, which may be repeated, is based on the recent entrepreneurial process of that bring diverse groups of scientists, engineers and business experts together to explore the feasibility of new technologies. In this class, the experts will be researchers, faculty and their students from other departments that are currently working in data science. Teams will be formed based on the application and computational need, and CS students will be assigned to assist in the implementation of the projects. It is anticipated that many of the projects arising from these collaborations will form the Plan A theses topics for Data Science MS students.

A student must pursue the Plan A option with the minimum of 30 credit hours, six of which must be thesis hours, designated as CS 6970. These requirements mirror our existing Computer Science MS.

The department will offer special topics classes in Data Science based on advancements in technology, specific research interests of faculty and perceived need. Other than this CS option, only a few possible elective courses are listed. The field of data science and the course offerings within the university are in a state of flux, with many colleges adding new courses covering data science from their perspective. In particular, the Statistics department in the College of Science is currently developing their own data science program and adding many new courses. Statistics underlies many of the methods applied in Data Science, and CS students will be directed to take appropriate courses once it becomes clear which courses are available and appropriate.

Data Science is multidisciplinary and covers a broad range of problems and methods. The classes listed above as electives are a sampling of possible classes the students may take. Many additional classes in data science related areas are currently being designed and approved. The CS program in Data Science needs to be flexible to customize the degree to the requirements and objectives of each student. This is the underlying reason for the built-in flexibility of classes outside the CS core. In every case, classes outside of the core must be approved by the student's committee and managed using the standard Program of Study process.

## **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.*

## Appendix C: Current and New Faculty / Staff Information

### Part I. Department Faculty / Staff

*Identify # of department faculty / staff (headcount) for the year preceding implementation of proposed program.*

	# Tenured	# Tenure -Track	# Non -Tenure Track
Faculty: Full Time with Doctorate	9	5	2
Faculty: Part Time with Doctorate	0	0	2
Faculty: Full Time with Masters	0	0	0
Faculty: Part Time with Masters	0	0	0
Faculty: Full Time with Baccalaureate	0	0	0
Faculty: Part Time with Baccalaureate	0	0	0
Teaching / Graduate Assistants			38
Staff: Full Time			3
Staff: Part Time			0

### Part II. Proposed Program Faculty Profiles

*List current faculty within the institution -- with academic qualifications -- to be used in support of the proposed program(s).*

	First Name	Last Name	Tenure (T) / Tenure Track (TT) / Other	Degree	Institution where Credential was Earned	Est. % of time faculty member will dedicate to proposed program.	If "Other," describe
<b>Full Time Faculty</b>							
	Vicki	Allan	T	PhD	Colorado State University	5%	
	Heng Da	Cheng	T	PhD	Purdue University	5%	
	Stephen	Clyde	T	PhD	Brigham Young University	5%	
	Curtis	Dyreson	T	PhD	University of Arizona	15%	
	Nicholas	Flann	T	PhD	Oregon State University	15%	
	Amanda	Hughes	TT	PhD	University of Colorado Boulder	5%	
	Minghui	Jiang	T	PhD	Montana State University	5%	
	Vladimir	Kulyukin	T	PhD	University of Chicago	5%	
	Young-Woo	Kwon	TT	PhD	Virginia Tech	5%	
	Kyumin	Lee	TT	PhD	Texas A&M University	30%	
	Mano	Chad	Other	PhD	University of Notre Dame	0%	Lecturer
	James Dean	Mathias	Other	PhD	Utah State University	0%	Lecturer
	Tung	Nguyen	TT	PhD	Iowa State University	5%	
	Xiaojun	Qi	T	PhD	Louisiana State University	5%	
	Haitao	Wang	TT	PhD	University of Notre Dame	5%	
	Daniel	Watson	T	PhD	Purdue University	10%	
<b>Part Time Faculty</b>							
	Kenneth	Sundberg	Other	PhD	Brigham Young University	0%	Instructor
	Jacob	Christensen	Other	PhD	Utah State University	0%	Instructor



	First Name	Last Name	Tenure (T) / Tenure Track (TT) / Other	Degree	Institution where Credential was Earned	Est. % of time faculty member will dedicate to proposed program.	If "Other," describe

Part III: New Faculty / Staff Projections for Proposed Program

*Indicate the number of faculty / staff to be hired in the first three years of the program, if applicable. Include additional cost for these faculty / staff members in Appendix D.*

	# Tenured	# Tenure - Track	# Non - Tenure Track	Academic or Industry Credentials Needed	Est. % of time to be dedicated to proposed program.
Faculty: Full Time with Doctorate	0	1	0		60%
Faculty: Part Time with Doctorate	0	0	0		
Faculty: Full Time with Masters	0	0	0		
Faculty: Part Time with Masters	0	0	0		
Faculty: Full Time with Baccalaureate	0	0	0		
Faculty: Part Time with Baccalaureate	0	0	0		
Teaching / Graduate Assistants	///	///	10		30%
Staff: Full Time			1		100%
Staff: Part Time			0		

## Appendix D: Projected Program Participation and Finance

### Part I.

*Project the number of students who will be attracted to the proposed program as well as increased expenses, if any. Include new faculty & staff as described in Appendix C.*

Three Year Projection: Program Participation and Department Budget						
	Year Preceding Implementation	New Program				
		Year 1	Year 2	Year 3	Year 4	Year 5
<b>Student Data</b>						
# of Majors in Department	630	674	721	771	825	883
# of Majors in Proposed Program(s)	//////	10	20	35	50	54
# of Graduates from Department	84	89	96	102	110	117
# Graduates in New Program(s)	//////	0	10	20	35	50
<b>Department Financial Data</b>						
	Department Budget					
	Year Preceding Implementation (Base Budget)	Year 1	Year 2	Year 3		
		Addition to Base Budget for New Program(s)	Addition to Base Budget for New Program(s)	Addition to Base Budget for New Program(s)		
<i>Project additional expenses associated with offering new program(s). Account for New Faculty as stated in Appendix C, "Faculty Projections."</i>						
<b>EXPENSES – nature of additional costs required for proposed program(s)</b>						
<i>List salary benefits for additional faculty/staff each year the positions will be filled. For example, if hiring faculty in year 2, include expense in years 2 and 3. List one-time operating expenses only in the year expended.</i>						
Personnel (Faculty & Staff Salary & Benefits)	\$2,029,180	\$159,500	\$162,690	\$165,943		
Operating Expenses (equipment, travel, resources)	\$92,149					
Other:						
<b>TOTAL PROGRAM EXPENSES</b>	//////	\$159,500	\$162,690	\$165,943		
<b>TOTAL EXPENSES</b>	\$2,121,329	\$2,280,829	\$2,284,019	\$2,287,272		
<b>FUNDING – source of funding to cover additional costs generated by proposed program(s)</b>						
<i>Describe internal reallocation using Narrative 1 on the following page. Describe new sources of funding using Narrative 2.</i>						
Internal Reallocation		\$116,000	\$118,320	\$120,686		
Appropriation						
Special Legislative Appropriation						
Grants and Contracts						
Special Fees						
Tuition						
Differential Tuition (requires Regents approval)						
<b>PROPOSED PROGRAM FUNDING</b>	//////	\$116,000	\$118,320	\$120,686		
<b>TOTAL DEPARTMENT FUNDING</b>	\$0	\$116,000	\$118,320	\$120,686		
<b>Difference</b>						
Funding - Expense	(\$2,121,329)	(\$2,164,829)	(\$2,165,699)	(\$2,166,586)		

## Part II: Expense explanation

### Expense Narrative

*Describe expenses associated with the proposed program.*

A cluster hire specifically in Data Science is underway University-wide. Faculty are being hired over a diversity of colleges and departments to support USU's new emphasis in Data Science. Many of these hires are directed to support specific applications of Data Science in the Colleges of Business, Agriculture, Education, Natural Resources, Science and the Humanities. Computer Science has been allocated one of these positions to support the proposed MS DS program specifically. An expectation of this new hire will be that they will contribute to teaching our existing Data Science classes and our newly proposed classes in advanced topics and the incubator class. The search for a person to fill this faculty position is underway.

The department is requesting funds for one additional full time staff (see Appropriation in Appendix D, part 1). The allocation of additional space for teaching, faculty offices, research and staff is underway. The COE is in the process of arranging for the CS department to move to a building local to the Engineering building that will increase the square footage available. Additionally, there is a commitment to invest in the extensive remodeling of this space to better accommodate the needs of the CS department.

## Part III: Describe funding sources

### Revenue Narrative 1

*Describe what internal reallocations, if applicable, are available and any impact to existing programs or services.*

The department is committed to hiring an additional teaching faculty for undergrad courses, freeing up teaching duties for research faculty needed to teach the new grad courses. Teaching assistants for these courses will be provided as needed, funded completely or in part by the differential tuition generated by the courses themselves.

### Revenue Narrative 2

*Describe new funding sources and plans to acquire the funds.*

Current faculty members will assist in the development and maintenance of this program. Money for one new hire has already been allocated.

**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: On-Line Certificate in Engineering Education  
 Sponsoring School, College, or Division: Engineering  
 Sponsoring Academic Department(s) or Unit(s): Engineering Education  
 Classification of Instructional Program Code<sup>1</sup> : 14.9999  
 Min/Max Credit Hours Required of Full Program: 13 / 13  
 Proposed Beginning Term<sup>2</sup>: Fall 2017  
 Institutional Board of Trustees' Approval Date:

<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 checked="" type="checkbox"/> Graduate Certificate		
<input type="checkbox"/> K-12 Endorsement Program		
<input type="checkbox"/> NEW Emphasis for Regent-Approved Program		
<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.

\_\_\_\_\_ Date:

I understand that checking this box constitutes my legal signature.

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

<sup>2</sup> "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 Graduate Certificate: On-Line Certificate in Engineering Education effective Fall 2017. This program was approved by the institutional Board of Trustees on .

## 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.*

The certificate program emphasizes the learning and teaching of engineering with the goals to produce graduates that are familiar with the theory and practice of effective engineering education, are adept at these aspects within their specific area of engineering specialization and have the ability to develop, implement and assess engineering curricula.

To achieve these goals, students will complete 13 credit hours, combining course work (12 credits) and a comprehensive teaching and learning portfolio (1 credit). The curriculum has been divided into four 3 credit courses and an Internship course as shown below.

### 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](http://jobs.utah.gov/jsp/wi/utalmis/gotoOccinfo.do)) and the Occupation Outlook Handbook ([www.bls.gov/oco](http://www.bls.gov/oco)).*

Rapid changes in the worldwide engineering enterprise have motivated the profession to rethink how future generations of engineers should be educated with expertise in teaching and learning. To educate future engineers there is a need to better prepare them for critical elements of teaching and learning, and in particular in curriculum design, evaluation and assessment, principles of teaching and learning, and training development.

Utah State University (USU) is home to one of only a few departments in the nation in engineering education. The engineering education program at USU is one of a growing number of programs throughout the country. To meet the need of this growth, the proposed certificate program will provide skills for students interested enhancing their teaching and training skills in engineering. The proposed Graduate Certificate in Engineering Education is an initial certificate, however on a case-by-case basis, with advisement from the EED department, credits earned may be used toward completing a Ph.D. in Engineering Education.

Often, newly graduating engineering faculty are ill-prepared to effectively teach and many struggle as they move toward tenure. There is a need to give engineering faculty and industrial trainers an opportunity to improve their knowledge and skills in engineering teaching and learning.

The Department of Engineering Education completed a national survey of engineering education institutions (both academic and businesses) to determine the need for the program. The results of the survey indicate that potential participants would prefer to participate in an online program, that could be completed within 12 months. The participants in the survey also commented on the topics which should be included in program curriculum. The requests regarding the content of the program have been attended to and are reflected in the program structure and content as presented in the following sections of this document.

While there are already engineering education certificate programs at other universities, none offer a fully online program. The Graduate Certificate in Engineering Education program will be open to students without geographic limitations here in the U.S. and in other countries worldwide.

### 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/](http://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/](http://higheredutah.org/policies/policyr315/) .*

The mission of Utah State University is to be one of the nation's premier student-centered land grant and space grant universities by fostering the principle that academics come first; by cultivating diversity of thought and culture; and by serving the public through learning, discovery, and engagement. The online certificate program meets the university mission by serving the public and promoting learning environments, discovery, and engagement to improve engineering.

The existing faculty in the Department of Engineering Education (EED) will participate in facilitating the certificate program. There will be no need for additional faculty or other resources to facilitate the program. The certificate program will require four new courses to be developed. Each of the courses for the program will utilize content from existing courses in the Ph.D. program. The courses will be developed for online delivery by the existing EED faculty. There will be no negative budgetary impact on USU.

### 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.*

No new funds are required for the implementation of the online certificate program. The program will not impact other programs at Utah State University and will enhance the existing Ph.D. program within the department by offering an online option for students across the US and around the world. A 5 year proposed budget plan is illustrated in the table below.

	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Total
<b>STUDENTS</b>						<b>Totals</b>
Non-Resident	10	11	12	14	15	62
<b>REVENUES</b>						
Tuition \$394/credit						
1 student x 13 credits x \$394	\$51,220	\$56,342	\$61,464	\$71,708	\$76,830	\$317,564
EED Fees	\$15,600	\$17,160	\$18,720	\$21,840	\$23,400	\$96,720
Differential Tuition	\$8,970	\$9,867	\$10,764	\$12,558	\$13,455	\$55,614
	<b>\$75,790</b>	<b>\$83,369</b>	<b>\$90,948</b>	<b>\$106,106</b>	<b>\$113,685</b>	<b>\$469,898</b>
<b>EXPENSES</b>						
Tuition Expenses (\$394 - \$197)	\$25,610	\$28,171	\$30,732	\$35,854	\$38,415	\$158,782
Faculty Salary	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$100,000
Faculty Benefits (48%)	\$9,600	\$9,600	\$9,600	\$9,600	\$9,600	\$48,000
Graduate Student Support	\$19,800	\$19,800	\$19,800	\$21,220	\$21,220	\$101,840
Graduate Benefits (8%)	\$1,584	\$1,584	\$1,584	\$1,698	\$1,698	\$8,147
Insurance (8% increase/year)	\$1,584	\$1,711	\$1,848	\$1,995	\$2,155	\$9,293
Marketing/Recruitment	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
<b>TOTAL EXPENSES</b>	<b>\$83,178</b>	<b>\$85,866</b>	<b>\$88,564</b>	<b>\$95,367</b>	<b>\$98,088</b>	<b>\$451,062</b>

### 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
EEDC 6090	X	Course Design	3
EEDC 6150	X	Evaluation and Assessment	3
EEDC 6450	X	Principles of Teaching and Learning	3
EEDC 7310	X	E-learning Training and Development	3
EEDC 7900	X	Teaching Internship	1

#### Program Curriculum Narrative

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

## Certificate Courses

### EEDC 6450 Principles of Teaching and Learning

#### Course Description

The course provides opportunities for students to develop skills, strategies, and techniques used for instruction in engineering education. It also gives a chance to **think** about teaching and learning in engineering at the university and in industry. Topics covered in this course include: ways to improve efficiency as an engineering educator, problem-solving and creativity, active learning strategies, different content delivery methods, different types of learners, Piaget's and Perry's theories of cognitive development, Constructivism, different learning and teaching styles.

#### Course Objectives

After completing this course the students will be able to:

- Explain the different learning theories and be able to incorporate them into their teaching
- Describe the different models of cognitive development
- Classify different psychological types and explain how they learn
- Explain the difference between novices and experts and discuss steps in problem solving strategy
- Recognize the responsibilities that come with teaching
- Set goals and prioritize activities
- Discuss the advantages and disadvantages to different delivery mechanisms
- Recognize and employ active learning strategies
- Effectively use technology in and out of the classroom
- Apply effective communication and presentation skills
- Incorporate laboratory work, group and team activities/projects, and other practical skills into a course/training
- Apply effective classroom management

#### Course Content

The course will be organized around the following teaching and learning topics. Specific assignments and activities have been developed for each topic section.

- Learning theories and how people learn
- Cognitive development theories: Piaget and Perry, Vygotsky
- Importance of teacher training
- Teaching and research efficiency
- Problem solving and creativity
- Content delivery methods
- Active learning strategies and teaching with technology
- Incorporating design and laboratory work
- Classroom management with special consideration of difficult students

#### Course Requirements

- Assigned Text Readings - complete the assigned readings from recommended texts
- Online Readings - complete selected online readings related to the course sequence
- Online Class Discussion - participate in online class discussion
- Topic Activities - complete assigned activities for each topic

#### References:

Wankat, P.C. and Oreovicz, F.S. (2015). *Teaching Engineering* (2<sup>nd</sup> Edition), Purdue University Press. ISBN 978-1557537003).



## EEDC 6150 Evaluation and Assessment

### **Course Description**

The purpose of this course is to facilitate each student reaching a level high of competence and understanding of assessment practices used in engineering education. The focus of this course will be the nature of assessment, planning for assessment, validity and reliability, preparing and using achievement tests, writing traditional test questions (T/F, matching, multiple choice, etc.), more authentic assessment methods, grading and reporting, and using assessment in action research.

### **Course Objectives**

After completing this course the students will be able to:

- Discuss the relationship between instruction and assessment
- Apply taxonomies and instructional objectives to prepare students for assessment
- Identify methods used for assessment of learning
- Explain the advantages and disadvantages in the major types of assessment
- Describe the difference between norm referenced and criterion reference assessment
- Develop standards for student assessment
- Select and develop assessment methods appropriate for instructional decisions
- Explain the importance of validity and reliability in assessment
- Develop guidelines for effective and fair grading
- Collect appropriate assessment data
- Recognize the unethical, illegal, and otherwise, inappropriate assessment methods and uses of assessment information

### **Course Content**

The course will be organized around the following topics related to evaluation and assessment.

- Achievement assessment and the relationship between assessment and instruction
- The nature of student assessment
- Planning for assessment
- Validity and Reliability
- Preparing and using achievement tests
- The nature and creation of selection item type questions
- Performance assessments
- Grading and Reporting

### **Course Requirements**

- Assigned Text Readings - complete the assigned readings from recommended texts
- Online Readings - complete selected online readings related to the course sequence
- Online Class Discussion - participate in online class discussion
- Topic Activities - complete assigned activities for each topic

### **References:**

Waight, C.K. and Gronlund, N.E. (2013). *Assessment of Student Achievement* (10<sup>th</sup> Edition), Pearson, ISBN 978-0-13-268963-2

## EEDC 6090 Course Design

### **Course Description**

The aim of this course is to teach the students the necessary skills to create an effective educational or training engineering curricula. The course will focus on the different types of engineering courses (lectures, recitations, labs, design studios, etc.), creating goals and objectives, choosing effective teaching methods, choosing course reference materials, accreditation concerns, lesson planning, and course design.

### **Course Objectives**

After completing this course the students will be able to:

- Identify different types courses applicable for engineering education
- Identify functions and implications of various curriculum designs
- Develop an effective course/training program aligned with accreditation requirements
- Create objectives and goals for the course/training
- Identify effective teaching and learning methods for the course/training
- Identify instructional delivery methods that enhance student learning and achievement
- Develop effective assessment strategy for the course/training
- Create a list of resources essential for the course (e.g. textbooks, etc.)
- Continuous course evaluation process

### **Course Content**

The course will be organized around the following curriculum topics. Specific assignments and activities have been developed for each topic section.

- Character of course curriculum and its history
- Approaches and importance of course curriculum
- Students expectations of the course curriculum
- Curriculum development process
- Curriculum planning and implementation
- Planning learning activity and instruction
- Planning and implementation of student assessment
- Curriculum evaluation and change
- Planning course reading material and other resources

### **Course Requirements**

- Assigned Text Readings - complete the assigned readings from recommended texts
- Online Readings - complete selected online readings related to the course sequence
- Online Class Discussion - participate in online class discussion
- Topic Activities - complete assigned activities for each topic

### **References:**

Grunet, J., Millis, B.J., Cohen, M.W. and Diamong, R.M. (2008). *The Course Syllabus: A Learning- Centered Approach* (2<sup>nd</sup> Edition), Wiley, ISBN: 978-0470197615.

## EEDC 7310 E-learning Course and Training Development

### **Introduction**

The purpose of this course is to introduce core principles and the best practices of the design and implementation of online or web-assisted courses in the context of engineering education. The focus of this course is on the integration of research findings and best practices of online teaching and learning as well as tips and strategies for online course development and implementation.

### **Course Objectives**

After completing this course the students will be able to:

- Explain different course delivery formats
- Discuss different types of online formats
- Explain the learning theories that support online education
- Effectively use and manage a learning management system
- Implement instructional tools and strategies in web-facilitated and online learning environments with specific reference to engineering education
- Develop and implement an online or web-facilitated course in engineering, or related, field

### **Course Content**

The course will be organized around the following topics related to technology.

- Face-to-Face and Web Facilitated instructions
- Distance Education - Hybrid/Blended and Online instructions
- Educational, Administrative, and Online Education Standards
- Principles of online instruction and delivery
- Active learning in online education in context of engineering education
- Design strategies for online course
- Assessment in online engineering education
- Instructor role in online engineering education
- Ethical issues in online education

### **Course Requirements**

- Assigned Text Readings - complete the assigned readings from recommended texts
- Online Readings - complete selected online readings related to the course sequence
- Online Class Discussion - participate in online class discussion
- Topic Activities - complete assigned activities for each topic

### **References:**

Boettcher, J.V. and Conrad, R-M. (2016). *The Online Teaching Survival Guide: Simple and Practical Pedagogical Tips* (2<sup>nd</sup> Edition), Jossey-Bass, ISBN 978-1119147688

## EEDC 7900 Teaching Internship

### **Introduction**

The course aims to be a capstone activity for students pursuing Graduate Engineering Education Certificate to gain experience, improve understanding of teaching, reflect on their own teaching, and obtain feedback from faculty members and possibly from students.

The course should give students the opportunity to put their engineering education knowledge into practical application. Ideally, to register for the course students should have a significant teaching responsibility in engineering or science course(s), either at the university, community college, other institution of higher learning or industry.

### **Course Objectives:**

After completing this course the students will be able to:

- contrast critically student's teaching experience with theoretical knowledge gained in courses of the program,
- evaluate teaching experiences by using own reflections, students and faculty feedback,
- present teaching credentials by demonstrating teaching methods and approaches, and by analyzing evidence of student learning,
- articulate and justify the choices of teaching methods and activities,
- document professional development and to identify areas for improvement,
- assemble a teaching portfolio that highlights the quality and scholarship of one's own teaching in a presentable form, also for hiring purposes.

### **Course Content**

The course will be organized around the following topics related to teaching experience and preparation of teaching portfolio.

- Teaching philosophy,
- Teaching methods and approaches,
- Teaching skills,
- Documenting of professional development,
- Preparing a teaching portfolio
- Identifying areas for improvement.

### **Course Requirements**

Students enrolled in the course will be required to:

- read recommended material,
- submit fortnightly reflections on their teaching,
- prepare a professional teaching portfolio

### **References:**

Separate reading material for each topic in the form of research papers.

## **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*

Toggle Cut-and-Paste

Toggle Table

**Utah System of Higher Education  
Changes to Existing Academic Program Proposal  
Cover/Signature Page - Abbreviated Template**

Institution Submitting Request: Utah State University

*Current* *Proposed (if applicable)*

Program Title: Environmental Studies (BS)

Sponsoring School, College, or Division: Quinney College of Natural Resources

Sponsoring Academic Department(s) or Unit(s): Department of Environment and Society

Classification of Instruction Program Code<sup>1</sup>: 03.0103

Min/Max Credit Hours for Full Program Required: 76 / 77 52 / 55

Proposed Effective Term for Program Change<sup>2</sup>: Fall 2017

Institutional Board of Trustees' Approval Date:

Award Type: BS

**Program Change Type (check all that apply):**

<input type="checkbox"/>	Name Change of Existing Program
<input checked="" type="checkbox"/>	Program Restructure with or without Consolidation
<input type="checkbox"/>	Program Transfer to a new academic department or unit
<input type="checkbox"/>	Program Suspension
<input type="checkbox"/>	Program Discontinuation
<input type="checkbox"/>	Reinstatement of Previously Suspended Program
<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.

\_\_\_\_\_ Date:

I understand that checking this box constitutes my legal signature.

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

<sup>2</sup> "Proposed Effective Term" refers to term when change to program is published. For Suspensions and Discontinuations, "effective term" refers to the term the program will suspend admissions.

## Program Change Description - Abbreviated Template

### Section I: The Request

Utah State University requests approval to restructure Environmental Studies (BS) effective Fall 2017. This action was approved by the institutional Board of Trustees on .

### Section II: Program Proposal

#### Program Change Description/Rationale

*Present a brief program change description. Describe the institutional procedures used to arrive at a decision for the change. Briefly indicate why such a change should be initiated. State how the institution and the USHE benefit by the change.*

The curriculum for the B.S. in Environmental Studies is being updated to (1) eliminate the Areas of Emphasis, all of which have been found to add no value to the core degree, as evidenced by the majority of students choosing to use the emphasis ("Environmental Stewardship") that allows students to create a custom emphasis of 15 credits; (2) respond to a substantial new market among regional campus students, by making the degree available through Distance Learning modes; and (3) respond to assessment data which indicate a need to increase specific skill development, such as statistical analysis. This third aim is facilitated by the recent and current hiring of faculty in the specified skills areas since the last curricular revision. The proposed changes in the curriculum for the Environmental Studies major (B.S.) are modest -- substantially less than 50% -- but they do include the elimination of the seven existing Areas of Emphasis. These changes were developed by a committee of faculty in the Department of Environment & Society (ENVS). The full ENVS faculty then voted unanimously to adopt these changes at a formal faculty meeting on January 25, 2017.

#### Consistency with Institutional Mission/Institutional Impact

*Explain how the action is consistent with the institution's Regent-approved mission, roles, and goals. Institutional mission and roles may be found at [higheredutah.org/policies/policyr312/](http://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/](http://higheredutah.org/policies/policyr315/). Will faculty or staff structures be impacted by the proposed change?*

The proposed revisions will modernize the Environmental Studies program and make it consistent with new areas of expertise in ENVS and at Utah State University. Assessment data indicate that this change will better meet the needs and career aspirations of students majoring in Environmental Studies by emphasizing specific skill development. These changes also will facilitate the university's ability to make the degree available to students at regional campuses through Distance Learning. In addition, the program restructure will result in greater efficiency, given the elimination of the Areas of Emphasis.

#### Finances

*What costs or savings are anticipated from this change? If new funds are required to implement the change, indicate expected sources of funds. Describe any budgetary impact on other programs or units within the institution.*

No budgetary impact is expected from this change. Course delivery by distance mode is either already in place or is currently underway, at no additional expense. Facilitating regional campus student participation should lead to increased enrollments in the program; however, the program has the ability to accommodate these additional students without a need for additional resources.