

EXECUTIVE SUMMARY

Item Name: Request for New Academic Programs for Northern Arizona University (NAU)

- Action Item
- Committee Recommendation to Full Board
- First Read of Proposed Policy Change
- Information or Discussion Item

Issue: Northern Arizona University asks the board to review and approve one new program request effective in the 2018-2019 catalog and one new program request effective in the 2019-2020 catalog.

Enterprise Strategic Plan

- Empower Student Success and Learning
- Advance Educational Attainment within Arizona
- Create New Knowledge
- Impact Arizona
- Compliance
- Real property purchase/sale/lease
- Other:

Statutory/Policy Requirements

ABOR Policy 2-223.A, The Academic Strategic Plan

Background/History of Previous Board Action

As provided in the board policy, new program requests may be submitted throughout the year with the approval of the Academic and Student Affairs Committee.

Discussion

Northern Arizona University seeks to add one new program for implementation in the 2018-2019 Academic Year and one new program for implementation in the 2019-2020 Academic Year. This request is for the MED in International Education Leadership (Spring 2019) and the BS in Data Science (Fall 2019). These programs both further the goals of the NAU academic strategic plan by advancing educational opportunities for individuals in areas of growing demand.

Committee Review and Recommendation

The Academic and Student Affairs Committee reviewed this item at its March 22, 2018 meeting and recommended forwarding the item to the full board for approval.

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Requested Action

Northern Arizona University asks the board to review and approve one new program request effective in the 2018-2019 catalog and one new program request effective in the 2019-2020 catalog.

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Table 1 - Proposed New Programs

Name of Proposed Degree (degree type and major), College/School, Location, Anticipated Catalog Year	Program Fee Required? (Yes or No)	Brief Description Justification and Identified Market Need	Learning Outcomes and Assessment Plan	Projected 3rd Year Enrollment
International Education Leadership, MED College of Education Flagstaff (online) 2018-19 Catalog year (spring 2019 launch)	No	<p>The Master's Degree in International Education Leadership will provide cross-disciplinary education in the preparation of globally competent leaders and practitioners in the field of international education. The proposed degree aligns not only with the University's goal regarding global citizenship, but also with NAU's commitments to diversity and community engagement on a global scale.</p> <p>Justification: The degree targets individuals interested in leadership roles within study abroad programs, English as a Second Language initiatives, intensive language programs, international student services (including recruitment, admissions, and advising), international professional training programs, and government programs and agencies. The degree is a response to growth in international education over the last</p>	<p>Graduates will be able to demonstrate the following learning outcomes:</p> <p>Concepts (Knowledge)</p> <ol style="list-style-type: none"> Gaining knowledge of the major theories, research methods, and approaches to international education in the context of higher education. Understanding personal leadership styles, management of international programs, and intercultural development levels. Developing an awareness of the global framework of international education grounded in an interpretation of the complex political and cultural web of values and rights. <p>Competencies (Skills)</p> <ol style="list-style-type: none"> Illustrating the applications and relationships within international higher education contexts and leadership styles in written and/or oral presentations and through 	50

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		<p>two decades, which has spawned more professionals serving that growth. In addition, there has been increased interest among professionals pursuing advanced degrees that focus on global learning and international perspectives. However, few graduate programs offer a degree that prepares practitioners, researchers, and leaders in international education.</p> <p>People seeking entry into these fields form the primary market, but a strong secondary target group consists of those professionals already working in the field of international education seeking to advance to higher administrative level positions which require advanced degrees. The proposed program will be online to serve students locally, regionally and nationally.</p> <p>Market Need: International Education has grown rapidly in the last two decades at community colleges, colleges and universities nationally and internationally. For example, enrollment of international students at NAU has nearly doubled in the 10 years from</p>	<p>critical reflection and employing multiple perspectives on culture.</p> <p>2. Understanding, collecting and using data to identify international program goals, assess effectiveness, and implement plans to reach program goals in international higher education centers/organizations.</p> <p>3. Assessing and responding to community and stakeholder interests, needs and challenges regarding international and cultural practices and events.</p> <p>4. Applying knowledge through an internship experience to promote the success of international programs in international higher education centers/organizations.</p> <p>Measures</p> <ul style="list-style-type: none"> • Written and Oral Presentations through key assignments in core classes • A signature assignment completed during the internship which is the capstone experience <p>Assessment Method and/or Instrument(s)</p> <ul style="list-style-type: none"> • During their final course (the internship), students will be assessed through their signature
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		<p>2007 to 2016 (Arizona Rural Policy Institute, 2017). According to industry experts, higher degrees are required for evolving careers in this growth field.</p> <p>In a recent search of the three prominent sites advertising jobs in international higher education institutions (Forum on Education Abroad, NAFSA Career Center and Job Registry, and Higher Education Jobs), over 200 current job postings were identified. Almost all of these jobs list master's degree as strongly preferred or required in a field similar to this program. The Occupational Outlook Handbook published by the U.S. Bureau of Labor Statistics indicates that the job outlook for Postsecondary Education Administrators (includes International Education) is growing faster than average (10%) with the typical entry-level education being the master's degree.</p> <p>A survey of marketability and niche growth reveals that universities and colleges in the United States are placing significant emphasis on global initiatives (Albatch & Knight, 2006; Cambridge & Thompson, 2004; Desoff, 2010). In fact, the</p>	<p>assignment, which includes developing and submitting a comprehensive paper that ties the knowledge gained in their coursework to their internship. Students will synthesize the practical aspects of their internship with the theoretical and operational knowledge developed in their academic coursework. The paper also allows faculty to assess students' ability to think critically, as they apply and evaluate perspectives, knowledge, and opinions gained from course concepts and applied in their internship experiences.</p> <ul style="list-style-type: none"> • Program-area faculty will assess student performance in their coursework through key assignments on an ongoing basis. As required for university accreditation standards, formal action plans for curriculum improvements, as well as implementation actions, will be reported to NAU's Office of Academic Learning and Assessment. • Program quality will be evaluated through analysis and review of aggregated and individual student assessment data, supplemented by alumni and 	
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		<p>U.S. Department of Commerce estimates that international students contributed \$39 billion to the U.S. economy in AY 2016, a significant increase to the 2015 figure of \$35 billion (IEE Open Doors Report, 2017).</p> <p>According to the American Council on Education's (ACE) 2012 "Mapping of Internationalization on U.S. Campuses," 47% of U.S. institutions of higher learning reported an increase in funding for international initiatives. The increase reflects both a growing interest in the field and universities' commitment to building partnerships with international universities for student/faculty exchange, global learning outcomes in curriculum, increased support for study abroad, international programming and international student admissions (Mazzarol, Soutar, & Seng, 2003; NAFSA, 2012). International student enrollment in US schools has doubled since 1998-99 to 975,000 students. Moreover, global student mobility grew from 2.1 million students in 2001 to 4.5 million students in 2014. Current data also supports the notion that internationalization requires development and delivery of</p>	<p>employer surveys. Those will include the number of applicants, students enrolled, degree completion rates and time to degree. We will also develop mechanisms to track the number and type of graduates' job placements, research publications, conference presentations, and international education-related awards.</p> <p>See Appendix for curriculum map.</p>	
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<p>Bachelor of Science in Data Science College of Engineering, Forestry, and Natural Sciences. Northern Arizona University Flagstaff, AZ 2019-2020 Academic catalogue</p>	<p>No</p>	<p>learning models and programs to train professionals in the field of international education (IEE Open Doors Report, 2015).</p> <p>Data science is the equally weighted intersection of statistics and computer science applied to an area of specialization. This program will focus on the statistics and computer science aspects while simultaneously encouraging students to pursue a minor in an application field of interest (e.g. actuarial science, business, genetics, and political science). As more industries collect large streams of data for their ongoing operations, individuals with the skills to manipulate and analyze the data will be in high demand.</p> <p>Throughout the program, students will see real (messy and complex) data from a variety of disciplines. Graduates of the program will be trained with the necessary computing skills to utilize and create algorithmic solutions to problems, create data visualizations and manipulations to discover relationships in data, and learn the use of statistical and machine learning methods to</p>	<p>27</p>
<p>Graduates will be able to demonstrate the following Learning Outcomes</p>		<p>Concepts (Knowledge)</p> <ul style="list-style-type: none"> • Understand principles of data organization and storage. • Evaluate the applicability of available data to address a desired question. • Choose among analysis methods based on the design constraints. • Assess model fit to data and propose model modifications. • Assess statistical significance and interpret the results in the situational context. • Evaluate the trade-offs of various computational and inferential issues approaches. • Explain statistical and computational methodology. <p>Competencies (Skills)</p> <ul style="list-style-type: none"> • Mathematics competency using calculus, matrix algebra, and probability theory to solve problems. 	

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		<p>model relationships in data and make predictions.</p> <p>Program learning outcomes and content are based on industry needs and trends, combined with flexibility to allow students to gain context knowledge in a chosen discipline of application. This model for a BS in Data Science with a minor in a content field will provide an educational route for a wide spectrum of students, providing applicable skills to serve more industries and fields that embrace data quantification.</p> <p>Justification: The purpose of the BS in Data Science is to prepare students to enter the job market in careers such as “data scientist” and “analyst” positions across a wide range of disciplines.</p> <p>This program builds on expertise within the Department of Mathematics and Statistics and represents a natural complement to the MS in Statistics.</p> <p>Market Need: The US Bureau of Labor Statistics does not track Data Scientist as a separate job category, due to its emergent</p>	<ul style="list-style-type: none"> • Coding competency by creating computer scripts and software programs. • Competency with data manipulation and transformation, regardless of format and/or size. • Fitting statistical and machine learning models to data using software. • Summarizing data and analysis results via numerical and graphics. • Convey model information to both technical and non-technical audiences. • Effectively work in small technical groups. <p>Measures/Assessment Method and/or Instrument(s): Two formal direct assessment measures of Student Learning Outcomes will be applied: a Capstone Course Evaluation and an Embedded Assignment Evaluation. The embedded assignment(s) will occur in STA 478 and address technical and reasoning SLOs, while the capstone evaluation will address all SLOs. We choose to assess in two separate courses so as to measure student performance against a consistent set of problems as well as in an authentic analysis setting. Indirect measures of</p>	
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		<p>status. However, the closest job category to the proposed program, Statistician, is projected to have 30,000 new jobs (a 34% increase) over the next 10 years¹. At the same time, they estimate the number of analyst positions in fields that employ data science will also grow (e.g. Marketing Research Analyst, Operations Research Analyst, Financial Analyst). In 2011, McKinsey Global Institute² predicted the U.S. will need up to 190,000 new professionals with analytical skills. In 2017, LinkedIn reported Data Scientist in the top two emerging professions, and IBM³ predicted 364,000 new Data Science / Analytics job listings by 2020. Taken together, there is a strong workforce demand for graduates of this program both in Arizona and across the United States.</p>	<p>assessment will include graduate placement into data science and/or analyst positions as well as student involvement and success in regional “Data Fest” competitions.</p> <p>See Appendix for curriculum map.</p>	
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¹ <https://www.bls.gov/ooh/math/statisticians.htm>

² McKinsey Global Institute, *Big data: The next frontier for innovation, competition, and productivity*, May 2011; <http://www.mckinsey.com/business-functions/business-technology/our-insights/big-data-the-next-frontier-for-innovation>.

³ <https://www.forbes.com/sites/louiscolombus/2017/05/13/ibm-predicts-demand-for-data-scientists-will-soar-28-by-2020/#4155fcf67e3b>

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**Appendix
 Curriculum Maps**

International Education Leadership, MED Curriculum Map

	Elucidate the major theories, research methods, and approaches to international education in the context of higher education and illustrate their applications and relationships to applied contexts in written and/or oral presentations	Assess personal leadership styles and intercultural development levels through critical reflection, and employ multiple perspectives on culture in presentations and written papers, and discussions.	Understand, collect and use data to identify international program goals, assess effectiveness, and implement plans to reach program goals in international higher education centers/organizations.	Develop a global framework of international education grounded in an interpretation of the complex political and cultural web of values and rights.	Understand effective international program administration including project management, strategic planning, data management, budgeting, and staff management skills.	Draw on relevant literature to articulate and address significant challenges in assessing and responding to community and stakeholder interests and needs regarding international and cultural practices and events.	Apply knowledge through an internship experience to promote the success of international programs in international higher education centers/organizations.
EDF 673 International Education	X		X	X			X
EDF 677 Educational Sociology	X			X		X	X
EDF 672 Comparative Education				X	X	X	X

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EDF 651 Current Issues in International Education	X	X	X	X	X	X
CCHE 680 Higher Education in the US	X	X	X	X	X	X
EDL 653 Intercultural Communication and Leadership	X	X	X	X	X	X
EDL 655 International Education Operations and Finance	X	X	X	X	X	X
EDL 610 Introduction to Research	X	X	X	X	X	X
EDR 611 Action Research	X	X	X	X	X	X
EDL 696 Internship Elective	X	X	X	X	X	X

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Data Science, B.S. Curriculum Map

	MAT 136, 226, 216	CS 126, 136, 200	CS 249, 345	STA 141	STA 275	STA 371, 471	STA 444, 445	STA 478	STA 486C	ENG 105, 305W
Technical										
Mathematics competency using calculus, matrix algebra, and probability theory.	I				R	R,C				
Coding competency to create computer scripts to solve tasks, create complex software programs, and use modern software development tools.		I,R,R					R,C	C	C	
Data wrangling to access and store data in a variety of formats, perform complex transformations and summarizations, and reshape data for analysis procedures								C	C	
Fit statistical and machine learning models to data using software, obtain model diagnostics, and model predictions.					I	I,R		C	C	
Summarize data and analysis results via numerical and graphics methods by creating graphical summaries of the data and model suitable for both a technical and general audience.				I	I	R	R		C	

Reasoning

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The map uses Introduce, Reinforce, and Competency to denote where and how students are exposed to each learning outcome and the columns correspond to the following course blocks:

MAT 136	Calculus I
MAT 226	Discrete Mathematics
MAT216	Introduction to Matrix Algebra
CS 126	CS I
CS 136	CS II
CS 200	Computer Organization
CS 249	Data Structures
CS 345	Data Bases
STA 141	Exploratory Visual Data Analysis
STA 275	Introductory Statistics
STA 371	Intermediate Statistics
STA 471	Regression Analysis
STA 444	Introduction to R
STA 445	Data Wrangling and Exploration in R
STA 478	Statistical Computing
STA 486C	Capstone Experience
ENG 105	Critical Reading and Writing in the University Community
ENG 305W	Writing in Disciplinary Communities