PCAF: Design and Build for Manufacturing Technology (AAS)

The proposed A.A.S. in Design and Build for Manufacturing Technology is an integration of the Manufacturing Tooling Technology (MFGT-AAS) and Cad Drafting and Tool Design (CDTD-AAS) degrees. "The first main element of the DBMT degree is derived from CDTD, defined as the design and conceptual development of manufacturing components and tooling systems. The second main element of the DBMT degree is derived from MFGT, defined as the physical build and assembly of these components and tooling systems within a robust manufacturing process." The target date for implementation is Fall 2020.

I support the proposed A.A.S. in Design and Build for Manufacturing Technology for the following reasons:

- More efficient use of resources. "This integration will pool program resources into a common inclusive effort." "No additional resources will be required. Faculty from existing MFGT and CDTD programs will be utilized."
- Outstanding job prospects for graduates. "A sizable professional trades shortage exists in Michigan and is expected to continue through 2024. Professional trades will account for more than 500,000 jobs in the Michigan economy, and approximately 15,000 new job openings are expected annually in the state during that time."

I approve the PCAF giving permission for the faculty to develop the full proposal with the understanding that, over this next budget year (2019-20), the proposers work with the account clerk in the College of Engineering Technology, Richard Goosen, Kim Wilber and myself to budget for any additional costs which may be incurred as a result of the integration of the MFGT-AAS and the CDTD-ASS degrees.

8/20/19

Form PCAF – Preliminary Curriculum Approval Form Effective Fall 2016

Directions: This form should be completed using **11-point font** or larger and should be no longer than six pages (excluding the signature/comment pages and references). For purposes of expediting the preliminary approval process, forms may be forwarded electronically by the initiator and from one administrative level to another.

Name(s) of proposal initiator(s): Louis Nemastil, Associate Professor & Mark Dunneback, School Director
Department(s)/College(s): Manufacturing Department, School of Design & Manufacturing / CET

Type of curriculum change (check one):

☐New degree
☐New minor requiring new courses/resources
☐New Concentration in existing degree/program
☐Curricular customization of existing program for off-campus cohort group
☐New certificate requiring 3 or more new courses and/or new resources
☒Existing program redirection or shift in emphasis if 3 or more new courses and/or new

1. Name of degree, major, concentration, certificate, or minor. Briefly describe the curriculum plan/template. The proposed redirection of the MFGT-AAS and CDTD-AAS degrees will result in a new singular AAS degree named: "Design & Build for Manufacturing Technology" (DBMT). DBMT is an integration of "Cad Drafting & Tool Design" (CDTD) and "Manufacturing Tooling Technology" (MFGT). The first main element of the DBMT degree is derived from CDTD, defined as the design and conceptual development of manufacturing components and tooling systems. The second main element of the DBMT degree is derived from MFGT, defined as the physical build and assembly of these components and tooling systems within a robust manufacturing process.

2. Target date for implementation. Fall Semester of 2020

3 Briefly explain the rationale for this initiative. If the initiative involves customization of an existing program for delivery to an off-campus cohort group, also explain the nature of the proposed curricular customization. DBMT is a single path curriculum that provides students multiple opportunities to incorporate both the design and build phases of manufactured components and tooling systems. Whereas the CDTD and MFGT predecessors were taught as separate entities, the DBMT program is an integrated approach that allows students to incorporate technical design into the development of manufacturing processes necessary to realize the final product. The degree is designed to prepare students to enter industry directly, to design and build component tooling systems, support engineering and manufacturing activities and provides the technical foundation required to be successful in today's modern manufacturing work environment.

4 Are there similar programs at other Michigan universities? If so, where? What is the enrollment in the other programs? No other Michigan university currently offers an integrated "design and build" curriculum platform. Northern Michigan University offers two separate AAS degrees in the study of Manufacturing: Computer Numerical Control Technology and Engineering Design. Enrollment information for NMU's programs was not available. The remaining Michigan universities offer four-

year BS degrees in Product Design, Industrial Design, and Manufacturing Engineering and/or Manufacturing Engineering Technology. Western Michigan University recently opened the Advanced Manufacturing Partnership Laboratory (AMP) with Grand Rapids Community College and local Grand Rapids area manufacturers. The AMP lab facility is designed to train individuals for the workforce, but does not confer a specific AAS degree.

5 Briefly explain any similarities of the proposed initiative (program objectives and/or curriculum) with already established FSU or KCAD programs: The DBMT program is an integration of CDTD and MFGT. These two existing programs will close upon successful launch of DBMT. The DBMT program is similar in curriculum structure to the Welding Technology and Automotive Technology AAS degree programs. The DBMT degree will provide students the opportunity to enter the workforce directly or continue their educational path toward earning a BS degree in Plastics Engineering Technology, Manufacturing Engineering Technology, Product Design Engineering Technology, Technical Education, or potential subject areas within the College of Business.

6 Briefly describe indicators of the employment market for students completing this initiative, including sources used for employment information/data.
Listed below are two career pathways for prospective graduates of the DBMT program.
Career Outlook and Salary for a Tooling Engineer (MFGT):
Educational Requirements: Associate and bachelor's degrees
Job Skills: Excellent technical skills, strong program management abilities, effective communication skills, and solid analytical abilities.
Median Salary: (2017) $70,505
Job Outlook: (2016-2026) 8% growth
Sources: U.S. Bureau of Labor Statistics
Career Outlook and Salary for a Mechanical Drafter (CDTD):
Education: Associate and bachelor's degrees
Job Skills: Independent work, computer-aided drafting, visual aptitude.
Median Salary (2017) $55,130
Job Growth: (2016-2026) 5% growth
Source: U.S. Bureau of Labor Statistics

7 Briefly describe indicators of potential student interest/demand for the new initiative, including sources used for student market information/data. Current student populations exist in MFGT and to a lesser extent in CDTD. This integration will pool program resources into a common inclusive effort. Projected job outlooks are positive in both of these areas (cited above). The technical skills gap and industry demand in Michigan and throughout the nation is well accepted.
The "Going Pro in Michigan" website (2019, https://www.mitalent.org/skilled-trades) states:
"A sizable professional trades shortage exists in Michigan and is expected to continue through 2024. Professional trades will account for more than 500,000 jobs in the Michigan economy, and approximately 15,000 new job openings are expected annually in the state during that time. Wages for professional trades occupations is 45 percent higher than other occupations – $51,000 is the median annual salary for these jobs!"

8 To what extent will this initiative draw new students to FSU or KCAD? To what extent will it draw students from existing programs? Ferris State University College of Engineering Technology students like conceptually creating and physically making things. The DBMT program combines the existing conceptual (CDTD) and the project-based (MFGT) curriculums to achieve student success. Career-oriented students who ultimately select Ferris State University are seeking this type of hands-on learning environment. Employers seeking FSU graduates want cross-disciplined employees capable of designing and enacting solutions in fast-paced, tight-margin manufacturing job markets.

The Proposed DBMT curriculum offers five main mechanisms directed toward integration of design and manufacturing technology: Design, Build, CNC, Metrology, and Tooling Economics. Together these five mechanisms will make the integrated DBMT program unique to similar offerings at community colleges or universities singularly focused on either design or tooling. DBMT will also offer internal transfers migrating from more specialized programs (WELD, MECH, PLRU, etc.) an alternative option at FSU to apply skills within career-oriented trades.

9 Approximately how many students are expected to enroll? Include rationale for estimates.
A cohort of 15 students in the first year? A cohort of 30 students after three years?
The first year numbers match current MFGT enrollment. Incorporating CDTD enrollment provides an additional 5 - 7 students. The exact enrollment numbers will depend upon marketing efforts at both the university and program level. The newly renovated Swan Annex can accommodate two cohorts of 30 (60 students per year) if adequate faculty and material resources are provided.

10 At which FSU campuses/regional centers or other sites will the initiative be offered? The DBMT program will be offered on FSU's main campus. Programs lectures will be offered in the Swan Technical Arts Building and lab activities will be offered in the Swan Annex. Due to a contractual agreement with Grand Rapids Community College, AAS level manufacturing courses cannot be offered on the Ferris State University Grand Rapids campus.

11 Will Internet or other distance learning technology be used for course/program delivery? Describe. Currently there is one course of study being considered for mixed delivery learning. The course of study is directed toward the tooling systems used to build stamping and forming dies. The course is fully developed in content but is not currently formatted for an online or mixed delivery.

Complete questions 12, 13, 14 in consultation with department administrator and/or dean.

12 Provide a rough estimate of the resources needed to implement the initiative. Please attach a three-year budget to include faculty salaries plus benefits, library materials estimate, equipment and classroom materials estimate, and renovation estimate. The DBMT program will require two FTE to cover the essential DBMT course work for a cohort of 30. An additional FTE is required to cover MFGT 150 (an existing technical related course utilized by MECH, WELD, AUTO, and others in CET). Yearly equipment and classroom material budgets are estimated at $36,000, using existing MFGT needs as working baseline. The budget, equipment requirements and the facility requirements to accommodate the proposed initiative are currently in place within the MFGT program.

13 Project the resources that could come from reallocation within the department or college and the new resources that would be required. No additional resources will be required- faculty from existing MFGT and CDTD programs will be utilized.

14 Are there new space needs? If so, how much? How would the space be used? Has existing space been identified? If so, where? Is renovation/remodeling necessary? The proposed DBMT program will conduct lab and lecture activities in the newly renovated Swan Building and the Swan Annex. The space required to accommodate the DBMT program is available and requires no additional renovations or capital improvements.

15 Is there professional accreditation for the program? Is it required or voluntary? Will accreditation be sought, and when? What will be the one- time and ongoing costs of accreditation? The DBMT program is not currently pursuing professional accreditation.

16 Has there been preliminary discussion with other departments/colleges that will be involved in course/program delivery? If yes, what was the feedback? The preliminary feedback from PDET and MECH has been favorable.

Department Faculty's signature: Dean R. Kruger Date 8/6/19

Note: Faculty signatories are tenure-track faculty who are involved with initiation of the proposal or who are collaborating with an administrator on the proposal.

Comments:

Department Administrator's signature: Mark Dombrosky Date 6-Aug-2019

Note: If this is an interdepartmental initiative, include additional Department Administrator signatures

Comments:

Dean's signature: Michael Goozen Date 8/6/2019

a. For cross-college initiatives, include additional signature(s) of Dean(s)
b. For existing programs customized for off-campus delivery to a cohort group, include College and EIO Deans' signatures

Comments:

KCAD President's signature: n/a Date _____
(KCAD proposals only)

c. For KCAD initiatives, include KCAD President's signature

Comments:

Provost's Signature: Paul Blake Date 8/22/19

☑ Approved - Approval indicates permission to develop the full proposal. It does not assure final approval.

Comments and/or suggestions:

☐ Not approved - Explanation:

c. Initiator(s)
Department Administrator(s)
Deans' Council
University Curriculum Council
Academic Senate
VPEIO
Provost
FSU Intranet