Patricia Elshafei has submitted a request for a major curricular change. His/her email address is: pelshafei@wsu.edu.

**Requested change:** Revise or Drop Graduate Certificate

**Title:** Manufacturing Leadership

**New Title:** Industrial Leadership

**Requested Effective Date:** Fall 2021

**Revise certificate requirement:** Yes

**Dean:** Field, David - Assoc Dean - VCEA - Grad,

**Chair:** Squires, Alice – Chair – Engineering and Technology Management,


| | | |
|---|---|---|
| Catalog Subcommittee Approval Date | AAC, PHSC, or GSC Approval Date | Faculty Senate Approval Date |

| From: | Squires, Alice |
| --- | --- |
| To: | Field, Dave; curriculum.submit; Squires, Alice |
| Subject: | Re: 609971 Engineering and Technology Management Requirements Revise - Revise or Drop Graduate Certificate |
| Date: | Monday, September 21, 2020 10:02:40 AM |

I approve this proposal in its current form.

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**From:** "Field, Dave" <dfield@wsu.edu>

**Date:** Friday, September 18, 2020 at 9:28 PM

**To:** "curriculum.submit" <curriculum.submit@wsu.edu>, WSU - Alice Squires <alice.squires@wsu.edu>

**Subject:** Re: 609971 Engineering and Technology Management Requirements Revise - Revise or Drop Graduate Certificate

I approve this proposal in its current form.

Dave

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**From:** curriculum.submit@wsu.edu <curriculum.submit@wsu.edu>

**Sent:** Friday, September 18, 2020 11:38 AM

**To:** Squires, Alice <alice.squires@wsu.edu>

**Cc:** Field, Dave <dfield@wsu.edu>

**Subject:** 609971 Engineering and Technology Management Requirements Revise - Revise or Drop Graduate Certificate

Squires, Alice – Chair – Engineering and Technology Management,

Field, David - Assoc Dean - VCEA - Grad,

Patricia Elshafei has submitted a request for a major curricular change.

**Requested change:** Revise or Drop Graduate Certificate

**Title:** Manufacturing Leadership

**Requested Effective Date:** Fall 2021

**Revise certificate requirement:** Yes

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Both Chair and Dean approval is required to complete the submission process. Please indicate that you have reviewed the proposal by highlighting one of the statements below and **reply all** to this email. (curriculum.submit@wsu.edu.) [Details of major change requested can be found in the attached supplemental

**From:** Field, Dave
**To:** curriculum.submit; Squires, Alice
**Subject:** Re: 609971 Engineering and Technology Management Requirements Revise - Revise or Drop Graduate Certificate
**Date:** Friday, September 18, 2020 6:28:07 PM

I approve this proposal in its current form.

Dave

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**From:** curriculum.submit@wsu.edu <curriculum.submit@wsu.edu>
**Sent:** Friday, September 18, 2020 11:38 AM
**To:** Squires, Alice <alice.squires@wsu.edu>
**Cc:** Field, Dave <dfield@wsu.edu>
**Subject:** 609971 Engineering and Technology Management Requirements Revise - Revise or Drop Graduate Certificate

Squires, Alice – Chair – Engineering and Technology Management,
Field, David - Assoc Dean - VCEA - Grad,
Patricia Elshafei has submitted a request for a major curricular change.
**Requested change:** Revise or Drop Graduate Certificate
**Title:** Manufacturing Leadership
**Requested Effective Date:** Fall 2021
**Revise certificate requirement:** Yes

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Both Chair and Dean approval is required to complete the submission process. Please indicate that you have reviewed the proposal by highlighting one of the statements below and **reply all** to this email. (curriculum.submit@wsu.edu.) [Details of major change requested can be found in the attached supplemental documentation]

1. I approve this proposal in its current form.
2. I approve this proposal with revisions. Revisions are attached.
3. I do not approve this proposal. Please return to submitter.

If you do not respond within one week, you will be sent a reminder email. If no response is received within three weeks of the submission date, the proposal will be returned to the submitter.

Thank you for your assistance as we embark on this new process. If you have any questions or concerns, please let us know wsu.curriculum@wsu.edu.

Blaine Golden, Assistant Registrar
Graduations, Curriculum, and Athletic Compliance
Washington State University
Registrar's Office
PO Box 641035
Pullman WA 99164-1035
509-335-7905
bgolden@wsu.edu

**Manufacturing Leadership Graduate Certificate**

Manufacturing and technical managers in today's manufacturing environments must demonstrate multifaceted leadership and a high level of technical expertise in order to compete in a world-class manufacturing arena. The four courses in this certificate program provide a unique, but essential foundation for understanding and optimizing a manufacturing organization. While many courses in manufacturing focus on the mechanical operations and processes, this certificate focuses on maximizing the performance of the entire system. Achieving the highest levels of performance starts with design of products and systems, integrating the contributions of a complex network of suppliers, and coordinating production according to key constraints throughout the supply chain. Finally, the most effective route to achieving continuous improvement in this environment is the integrated application of Lean, Six Sigma, and Theory of Constraints.

**Certificate Requirements**

Students must successfully complete four courses (12 credit hours).

E M 560 Integrated Supply Chain Management

E M 538 Lean Tools for Systems Improvement

E M 526 Constraints Management *

One of : **

E M 568 Risk Analysis and Management

E M 590 Leading Design and Innovation


**Curriculum Changes:**

1. Change Certificate name to "Industrial Leadership" from "Manufacturing Leadership"
2. Replace E M 526 Constraints Management for the third requirement with E M 570 systems Improvement: Integrating TOC, Lean, and Six Sigma to replace
3. E M 587 Managing Human Factors for Safety and Productivity can substitute for the fourth requirement.


**Justification for Curriculum Changes**

1. "Industrial" is a more broad term than "manufacturing", and industry includes healthcare, information technology, service industries, etc. that may not be traditional manufacturing.

2. E M 570 Systems Improvement: Integrating TOC, Lean, and Six Sigma has been completely revamped to equip industry leaders with the tools needed to lead impactful and sustained system improvements with all three improvement methodologies.  EM 526 is limited to teaching the thinking processes used in Theory of Constraints (TOC) only, and it does not teach students how to integrate TOC with broader system improvement techniques.  EM 570 was specifically

developed to apply TOC as it works synergistically with Lean and Six Sigma tools and techniques and needs to be included in the Manufacturing (Industrial) Leadership Certificate.

3. E M 587 Managing Human Factors for Safety and Productivity is a course that was recently developed and was not available when the Manufacturing Leadership Certificate was created. Thus, now that a course exists that teaches manufacturing and industry leaders how to manage human factors and safety, it should be included in this certificate.

**Graduate Certificate in ~~Manufacturing~~ Industrial Leadership**

1. *Credit Hours: 12 credit hours total*
2. *Required Courses*
   a. ~~E_M 526~~
   b. E_M 538
   c. E_M 560
   ~~c.~~d. E_M 570
   ~~d.~~e. E_M 568 or E_M 587 or E_M 590

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# COURSE SYLLABUS
# E M 570

**Course Name:** SYSTEMS IMPROVEMENT: INTEGRATING TOC, LEAN, AND SIX SIGMA

**Catalog Description:** E_M 570 Systems Improvement: Integrating TOC, Lean, and Six Sigma 3 Leveraging Theory of Constraints, Lean, and Six Sigma to achieve integrated systems level improvement. Credit not granted for both E M 470 and 570. Offered at 400 and 500 level. Typically offered Fall.

**Course Number**: E M 570                     **Semester Credits:** 3

**Instructor/Contact Information:** David Paulus, PhD, PE, CPEM, CQE, CHFEP, Jonah

Email: david.paulus@wsu.edu                     **Office Hours**: TBD

**Meeting Time:**   Monday 6:15 – 8:45 pm Pacific     **Prerequisites**: None

**Required Textbooks:**
1. "Theory of Constraints, Lean, and Six Sigma Improvement Methodology: Making the Case for Integration" By Bob Sproull ISBN 9780367247096
2. "Sustaining Workforce Engagement" by Lonnie Wilson, ISBN-10: 1138316032

**Course Description and Objectives**: The Theory of Constraints (TOC) is used for identifying a system's limiting factor and focusing efforts to eliminate that constraint in order to improve throughput, reduce inventory, or lower operating expenses.   Next, Six Sigma is a problem-solving methodology that uses the structured approach of Define, Measure, Analyze, Improve, and Control to reduce variability. Finally, Lean is a management approach that focuses on continuous improvement and respect for people in order to improve the performance of a system by eliminating waste.   TOC, Six Sigma, and Lean work synergistically by applying TOC to identifying what to improve, using the Six Sigma structured problems solving approach, and applying Lean tools for managing continuous improvement.

**Learning Outcomes:**   You will develop a management approach that integrates TOC, Six Sigma, and Lean that promotes workforce engagement, Students will be able to :

- Apply the Theory of Constraints to improve throughput of a system
- Apply Lean Tools to reduce waste in a system
- Apply Six Sigma problems solving techniques to reduce variability
- Engage their workforce to ensure they are healthy, happy, and productive
- Improve systems by integrating TOC, Lean, and Six Sigma methodologies

**Course Schedule:** (Subject to change)

| Class | Date | Topic |
|:-----:|:----:|-------|
| 1 | 8/26 | Introduction |
| 2 | 9/2 | TLS Chapter 1:  TOC |
| 3 | 9/9 | TLS Chapter 2:  Lean |
| 4 | 9/16 | TLS Chapter 3:  Six Sigma |
| 5 | 9/23 | TLS Chapter 4:  Integrate TOC, Lean, Six Sigma |
| 6 | 9/30 | Exam 1 |
| 7 | 10/7 | Workforce Engagement |
| 9 | 10/14 | TLS Chapter 7:  TOC Case Study |
| 10 | 10/21 | TLS Chapter 8:  Helecopter Case Study |
| 11 | 10/28 | TLS Chapter 9:  Healthcare Case Study |
| 12 | 11/4 | TLS Chapter 10: Medical Device Mfg Case Study |
| 13 | 11/11 | Workforce Engagement Case Study |
| 14 | 11/18 | Guest Speaker |
| 15 | 11/25 | No Class, Thanksgiving |
| 16 | 12/2 | Final Presentations |

## Grading:

A [94-100], A- [90-94), B+ [88-90), B [83-88), B- [80-83), C+ [77-80), C [73-77), C- [70-73), D [65-70), F [0-65)

- Exam: 20%   Four Case Studies (15% ea): 60%   Presentation:  20%

**Case Study Executive Summaries:** Students will submit an executive summary for each of the four case studies that will be covered in class. Students are required to receive peer evaluations for each case study before submitting the final case study. The outline for the two-page maximum executive summaries using the PARC method are as follows:

1. **Problem:** Summarize the story by introducing the customer/client and their pain point.

2. **Approach:** Explain what was done and how they did it.
3. **Results:** Highlight the key results including 1 or 2 statistics that drive home the takeaway message
4. **Conclusions:** Summarize the takeaway lesson and YOUR opinions about it.

**Case Study Peer Evaluations:** Case studies will be worked on in pairs during the live class session. Then you will be paired with a different student for one or two peer evaluations (scrutiny) which includes at least one of each:

1. Positive encouragement

2. Constructive suggestion

3. Question for consideration

At the end of class you will submit a pdf of your executive summary of each case study after peer evaluation in BB Learn. If you miss class, you will need to ask at least one other student to evaluate your case study before it is submitted. Case Study executive summaries are due my midnight on the Tuesday evening before the next class session. Be sure to include the name of the students that evaluated your executive summary on the final submission.

**Presentation:** On the last day of class, students will give a final presentation covering an application of something you learned in class. Tell us a 3-5 minute story. The presentation grading rubric is below: If the class enrollment is too large for presentations to be given during class times, a recording of the presentation will be submitted via Blackboard.

**Expectations for Student Effort:** For each hour of lecture equivalent, students should expect to have a minimum of two hours of work outside class

**Web Based Material:**    https://learn.wsu.edu/webapps/login/

**Attendance Policy:**    Students are responsible for any missed lecture notes and materials and may watch recordings of the online lecture.   Medical notes are not required for excused absences.   Exams are submitted online and late work will not be accepted with the exception of missing class for WSU sponsored events.

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|                                                                                              | Poor |   |   | Excellent |   |
|----------------------------------------------------------------------------------------------|------|---|---|-----------|---|
| **PRESENTATION SKILLS**                                                                      | **1** | **2** | **3** | **4** | **5** |
| Were the main ideas presented in an orderly and clear manner?................................ | , | , | , | , | , |
| Did the presentation fill the time allotted? ................................................ | , | , | , | , | , |
| Were the overheads/handouts appropriate and helpful to the audience? .................... | , | , | , | , | , |
| Did the talk maintain the interest of the audience? ...................................... | , | , | , | , | , |
| Was there a theme or take-home message to the presentation? ................................. | , | , | , | , | , |
| Was the presenter responsive to audience questions? ...................................... | , | , | , | , | , |

**KNOWLEDGE BASE**

|                                                                                              |   |   |   |   |   |
|----------------------------------------------------------------------------------------------|---|---|---|---|---|
| Was proper background information on the topic given? .......................................... | , | , | , | , | , |
| Was the material selected for presentation appropriate to the topic? ......................... | , | , | , | , | , |
| Was enough essential information given to allow the audience to effectively ............ evaluate the topic? | , | , | , | , | , |
| Was irrelevant or filler information excluded? ............................................ | , | , | , | , | , |
| Did the presenter have a clear understanding of the material presented? ................... | , | , | , | , | , |

**CRITICL THINKING**

|                                                                                              |   |   |   |   |   |
|----------------------------------------------------------------------------------------------|---|---|---|---|---|
| Were the main issues in this area clearly identified? ..................................... | , | , | , | , | , |
| Were both theoretical positions and empirical evidence presented? .......................... | , | , | , | , | , |
| Were the strengths and weaknesses of these theories, and the methods used to ......... gather this evidence adequately explained? | , | , | , | , | , |
| Did the presenter make recommendations for further work in this area? ................... | , | , | , | , | , |
| Did the main conclusions of the presentation follow from the material presented? ...., | , | , | , | , | , |
| Were competing explanations or theories considered and dealt with properly? ......... | , | , | , | , | , |

**OVERALL IMPRESSION** ...................................................................................... _____ / 15

**COMMENTS**

**TOTAL SCORE _____ / 100**

**Academic Integrity**

Academic integrity is the cornerstone of higher education. As such, all members of the university community share responsibility for maintaining and promoting the principles of integrity in all activities, including academic integrity and honest scholarship. Academic integrity will be strongly enforced in this course. Students who violate WSU's Academic Integrity Policy (identified in Washington Administrative Code (WAC) 504-26-010(4) will receive a zero on the assignment; further consequences range from failing the course, being placed on academic probation, or being dismissed from WSU. Students will not have the option to withdraw from the course pending an appeal, and will be reported to the Center for Community Standards.

Cheating includes, but is not limited to, plagiarism and unauthorized collaboration as defined in the Standards of Conduct for Students, WAC 504-26-010(3). You need to read and understand all of the definitions of cheating.  If you have any questions about what is and is not allowed in this course, you should ask course instructors before proceeding.

If you wish to appeal a faculty member's decision relating to academic integrity, please use the form available at communitystandards.wsu.edu. Make sure you submit your appeal within 21 calendar days of the faculty member's decision.

ETM mandates students to include the following statement on exams and other course assignments as required by the Instructor:

> *I commit myself to Washington State University's high standards to uphold academic honesty and scholarly values as established by the WSU's Standards of Conduct. I affirm that I have not given nor received any unauthorized assistance on this assignment/examination, that the work product presented here is the work of the author(s) [myself or all team members listed], and that all materials from other sources (including books, articles, Internet, or other media), whether quoted or paraphrased, have been properly cited.*
>
> *<student signature>*
>
> *Typing my name above serves as my signature*

**Academic Freedom**

WSU supports the faculty's academic freedom, right to freedom of expression, and responsibility to fulfill course objectives that are approved by the Faculty Senate. This is fundamental to who we are as an institution. Along with these rights comes the responsibility to protect the freedom of expression of all members of our community.

**Communication**

Please be reminded that we also recognize the importance of courtesy and decorum during all discussions – in class, in chat rooms, email, and other conversations. All official WSU email communication must be sent through the student's WSU email address.

**Professional Oral and Written Presentations**

The WSU ETM Master's degree is a professional graduate program. It is expected that student work be presented neatly and with correct English spelling, grammar and punctuation. There are numerous software packages available to help student. Also, the Graduate and Professional Writing Center is available to help on-line students. Visit-

https://writingprogram.wsu.edu/graduate-writing-center/ and
https://writingprogram.wsu.edu/graduate-writing-center/professional-editing-service-center/ for services.

**Incomplete Policy**

An incomplete (I) grade is given to a student who, for reasons beyond the student's control, is unable to complete the course requirements within the enrolled semester. An incomplete will only be considered if at least 50% of point assignments required in the course are completed and submitted by the end of the enrolled semester. The incomplete must be cleared and completed within one year following the semester in which the "I" grade was assigned. If the incomplete is not completed and a grade change is not submitted by the deadline, the grade will automatically change to an "F".

A student may not simply repeat the course to remove an Incomplete grade. A student must have a written permission from their faculty advisor to register for future semesters if the student has two or more Incomplete grades on their transcripts. If a student intends to graduate less than one year following the semester in which the 'I' grade was assigned, the student must clear the incomplete before the end of the semester that they intend to graduate or receive a certificate. A student will not be allowed to graduate or receive a certificate with an Incomplete grade on their transcript.

A student who desires an Incomplete grade must:

(1) Notify the professor in writing,
(2) Provide sufficient reason for the incomplete request,
(3) Complete and submit an Incomplete Grade Agreement Form found at

http://registrar.wsu.edu/media/753496/incompletegradeagreement.pdf

**Safety Statement**

WSU is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, http://safetyplan.wsu.edu. Before visiting campus, please also visit the University emergency management web site at http://oem.wsu.edu to become familiar with the information provided.

Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the "Alert, Assess, Act," protocol for all types of emergencies and the "Run, Hide, Fight" response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI's Run, Hide, Fight video and visit the WSU safety portal.

Full details can be found at https://provost.wsu.edu/classroom-safety/.

**Reasonable Accommodations**

Reasonable accommodations are available for students with documented disabilities or chronic medical or psychological conditions. If you have a disability and need accommodations to fully participate in this class, please visit your campus' Access Center/Services website to follow published procedures to request accommodations. Students may also contact their campus offices to schedule an appointment with a Disability Specialist. All disability related accommodations are to be approved through the Access Center/Services on your campus. It is a university expectation that students visit with instructors (via email, Zoom, or in person) to discuss logistics within two weeks after they have officially requested their accommodations. **Students**

**are responsible for initiating requests for reasonable accommodations and services that they need.**

For more information contact a Disability Specialist on your home campus:

- Pullman, WSU Global Campus, Everett, Bremerton, and Puyallup: 509-335-3417 Access Center (https://www.accesscenter.wsu.edu) or email at access.center@wsu.edu

- Spokane: 509-358-7816 Access Services (https://spokane.wsu.edu/studentaffairs/access-resources/) or email j.schneider@wsu.edu

- Tri-Cities: Access Services (http://www.tricity.wsu.edu/disability/) or email g.hormel@wsu.edu

- Vancouver: 360-546-9238 Access Center (https://studentaffairs.vancouver.wsu.edu/student-wellness-center/access-center) or email van.access.center@wsu.edu

**Student Grievance Process**

If a WSU Online student has a complaint or problem, the University offers the following channels as outlined below.

See: http://online.wsu.edu/nonResidentComplaintProcess.aspx

Academic Complaint Procedures (Academic Rule 1 04)

Students having complaints about instruction or grading should refer them first to the Instructor. If the complaint is not resolved, then the student may refer the complaint in writing to the chairperson of the department in which the course is offered by the end of the last day of the following semester (excluding summer term). The chair's decision shall be rendered within 20 business days. After the chair's decision, the student or the Instructor may appeal to the Dean's Office. Complaints must be presented in writing to the dean within 20 business days of the chair's decision. The written statement should describe the complaint, indicate how it affects the individual or unit, and include the remedy sought from the Dean. The decision of the Dean is the final step and shall be made within 20 business days. The University Ombudsman is available at any stage for advice or assistance in resolving academic complaints.

**Discrimination and Sexual Harassment**

If a WSU Online student has a complaint or problem, the University offers several remedies as outlined below.

See: http://online.wsu.edu/nonResidentComplaintProcess.aspx

**Academic Complaint Procedures** (Academic Rule 1 04)

Students having complaints about instruction or grading should refer them first to the instructor. If the complaint is not resolved, then the student may refer the complaint in writing to the Chair of the department in which the course is offered by the end of the last day of the following semester (excluding summer term). The Chair's decision shall be rendered within 20 business days. After the Chair's decision, the student or the instructor may appeal to the Dean's Office. Complaints must be presented in writing to the Dean within 20 business days of the Chair's decision. The written statement should describe the complaint, indicate how it affects the individual or unit, and include the remedy sought from the Dean. The decision of the Dean is the final step and shall be made within 20 business days. The University Ombudsman is available at any stage for advice or assistance in resolving academic complaints. At the branch campuses, the procedure is identical except that the academic area coordinator shall substitute for the department chair and the campus dean shall substitute for the college dean.

**Policy Prohibiting Discrimination and Sexual Harassment** *(Faculty Manual,* p. 30).

This policy expresses WSU's commitment to maintaining an environment free from discrimination, including sexual harassment. This policy applies to all students, faculty, staff, or others having an association with the University.

Additional information may be found in the Code WAC 504-26-220,-222, and -227. Relevant WSU policies and procedures can be located at https://ccr.wsu.edu/policies/. Complaints about discrimination or/sexual harassment can be directed to WSU's Compliance and Civil Rights, https://ccr.wsu.edu/file-a-complaint/. For WSU graduate students, procedures can also be found

at https://gradschool.wsu.edu/documents/2017/07/gs-grievance-procedures.pdf/. Visit the Office of Compliance and Civil Rights (https://ccr.wsu.edu) for more information.

**Reasonable Religious Accommodation**

Washington State University reasonably accommodates absences allowing for students to take holidays for reasons of faith or conscience or organized activities conducted under the auspices of a religious denomination, church, or religious organization. Reasonable accommodation requires the student to coordinate with the instructor on scheduling examinations or other activities necessary for course completion. Students requesting accommodation must provide written notification within the first two weeks of the beginning of the course and include specific dates for absences. Approved accommodations for absences will not adversely impact student grades. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence. Students who feel they have been treated unfairly in terms of this accommodation may refer to Academic Regulation 104 - Academic Complaint Procedures. See also Rule 82.

**Academic Calendar**

Students should refer to the academic calendar to be aware of critical deadlines throughout the semester. The WSU Online academic calendar can be found at http://registrar.wsu.edu/academic-calendar/.

**COVID-19 Policy**

Students are expected to abide by all current COVID-19 related university policies and public health directives, which could include wearing a cloth face covering, physically distancing, self-attestations, and sanitizing common use spaces. All current COVID-19 related university policies and public health directives are located at https://wsu.edu/covid-19/. Students who do not comply with these directives may be required to leave the classroom; in egregious or repetitive cases, students may be referred to the Center for Community Standards for university disciplinary action.