Creation of Design and Engineering Management  
College of Technology  
Department of Technology Systems; and,  
Department of Visual Communications and Technology Education

A. THE MODIFICATION

1. Describe briefly the nature of the proposed change.

This proposes a merger of the existing Mechanical Design and Manufacturing majors. The merger of Mechanical Design and Manufacturing majors results in Design and Engineering Management (DEM). This proposes:

- A Design and Engineering Management checksheet, shown in appendix A.
- Creating or modifying 4 courses, shown as separate proposals in appendix B.
- Changing 8 existing courses, prefix only, shown as a proposal in appendix C.

These changes are further discussed and explained below, as needed and appropriate, with separate sections (appendices) provided to detail all changes outlined above. Although not a proposed change a flow chart to be used as part of the advising process has been created as shown in appendix D. Also, a faculty load analysis is shown in appendix E.

1.1 A new DEM checksheet has been provided as part of the proposal. Shown at the conclusion of the current section (appendix A), the DEM checksheet embodies a Engineering Management core, a Engineering Management Concentration (primarily Quality Systems), and a Design concentration.

1.2 Catalog copy for the DEM is as follows:

Design and Engineering Management (DEM), as one of the newest curricula in the College of Technology, combines relevant contemporary theories to prepare technical managers for current and future technological challenges and opportunities. Unique design and/or applications oriented laboratory experiences apply course theories to bring knowledge to life.

DEM consists of a common core in Design and Engineering Management and two concentrations, Engineering Management (including Quality Systems), and Design. DEM is a interdisciplinary effort between the Department of Technology Systems and the Department of Visual Communications and Technology Education.

The DEM common core is a strong grounding of 39 semester hours of design, quality and manufacturing underpinnings, useful to technical managers in virtually any industrial environment. The core is designed to serve all technical managers as they prepare for professional practice.
Students elect to concentrate in either the Design or Engineering Management areas, for a total of 15 additional hours. Each concentration provides additional technical and professional preparation and focus, congruent with the core of DEM. Quality Systems is the main emphasis in the Engineering Management Concentration.

The Design concentration is a strong blend of computer aided design, basic and advanced design principles, applications of design to manufactured and mechanical products, product design, concurrent engineering and modeling systems, among other relationships critical to advancing and integrating the broader fields of Engineering Management, Quality Systems, and others. Design, applications and process engineering; and, design and engineering management are key career paths frequently followed based on the Design Concentration preparation.

The Engineering Management Concentration emphasizes Quality Systems ISO 9000 documentation and lean systems for improvement in manufacturing and non-manufacturing service environments. A blend of quality and lean principles provide professional bearing for leaders in change and improvement. Technical management of global enterprises for competitive innovation, development and transfer of processes and new products are key areas targeted as career paths in Engineering Management via the Quality Systems. The Quality Systems Specialization is offered completely online, oriented to non-traditional students, particularly designed for transfer students holding two year associate degrees.

2. List courses to be taken out of program requirements.

Several courses may be considered for removal in the future, as students requiring them in Manufacturing and Mechanical Design Majors graduate.

3. List courses to be added to program requirements.

A total of twelve courses are to be added to the course inventory. Three of these are being created or modified as part of the DEM proposal.

DEM 212: Introduction to design and engineering management (changed MFG 112)
DEM 330: Metrology and geometric dimensioning and tolerancing
DEM 430: Rapid prototyping
DEM 495: Engineering synthesis and applied research

The four new or modified courses are separately detailed and documented in appendix B as indicated above.

4. Describe any change to the sequence of courses within a major / minor / area of specialization / certificate.
A total of eight other courses are being changed in prefix, number or title as part of the Design and Engineering Management proposal, shown in appendix C:

MFG 235: Properties and testing of engineering materials (changed to DEM prefix)
MFG 350: Genealogy of lean (changed to QS prefix)
MFG 451: Time-based management or continuous flow (changed to QS prefix)
MFG 450: Foundations of lean manufacturing (changed to QS prefix)
MFG 220: Metallic materials and processes (changed to DEM prefix)
MFG 322: Non-metallic materials and processes I (changed to TECH prefix)
DESN 243: Statics and strength of materials (changed to DEM prefix)
TECH 323: Fluid power transmission (changed to DEM prefix)

These same eight courses are being removed under one prefix and added as a different prefix, number and/or title:

DEM 235: Properties and testing of engineering materials (changed from MFG prefix)
QS 350: Genealogy of lean (changed from MFG prefix)
QS 451: Time-based management or continuous flow (changed from MFG prefix)
QS 450: Foundations of lean manufacturing (changed from MFG prefix)
DEM 220: Metallic materials and processes (changed from MFG prefix)
TECH 322: Non-metallic materials and processes I (changed from MFG prefix)
DEM 243: Statics and strength of materials (changed from DESN prefix)
DEM 323: Fluid power transmission (changed from TECH prefix)

Course sequencing for DEM is similar to previous sequences for the MFG and DESN majors. The major changes lie in all students completing the DEM core and selecting an appropriate concentration for completion of the new DEM curricula as shown in appendix D, a flow chart intended to assist in the advising process.

5. Will this change result in modification of student learning outcomes: ___ yes XX no.

Outcomes for the new DEM curriculum remain similar to existing MFG and DESN majors.

6. Program changes approved before the January deadline for the Catalog update will be recorded in the Catalog and will be in effect for checksheets in the fall of that year (the DEM proposal may be moved forward for approval late in the spring, 2005 semester).

B. RATIONALE

1. Reason/Need for the change.

1.1 Rationale for the DEM proposal is based on the need to provide the most up to date and relevant academic program possible for students. Advisory committees over the past several years underscored the need for change, all consistent with professional bodies faculty are affiliated with. Co-op feedback and other industrial contacts have also confirmed the proposed changes.
1.2 The proposal supports the Academic Plan of the COT by proposing the best use of resources to fit existing and emerging needs.

2. Student implications (describe the basis for each estimate)

2.1 Prospective demand for a new degree / major / minor (level of student interest). Currently there are approximately 70-80 students served by the individual programs. The new DEM curriculum, as proposed, is anticipated to attract a new and growing audience of freshmen and transfer students.

2.2 Effect on required hours in degree / major / minor. The number of hours in the new DEM program will be similar to requirements in existing programs.

2.3 Number of students affected and in what way. Effects on students will be minimal since DEM is anticipated to be introduced beginning fall, 2005. Students will be advised into the program beginning academic year 2005-06 in anticipation of changes being approved spring, 2005, and implemented beginning fall, 2005. Existing majors (70-80) are being counseled according to anticipated changes currently.

2.4 Effect on elective hours of majors / minors. It is anticipated that existing majors and minors will be counseled according to item 2.3 above.

2.5 If a degree / major / minor is to be eliminated, how will current students in the program be accommodated? N/A

2.6 If requirements for matriculation from a pre-major program are to be added or modified, how will those changes affect student enrollment and progress toward graduation? No changes are anticipated in these areas.

C. IMPLICATIONS FOR OTHER EXISTING PROGRAMS

1. How will the proposed change affect the integrity of other programs to which it is related, including the demand for courses or degrees in other programs

1.1 in the department / school?

The DEM curriculum embraces several existing program bases which have been traditionally strong programs in the COT, and simultaneously provides new opportunities at BGSU, throughout northwest Ohio, and beyond.

1.2 in the college?

See C 1.1 above.

1.3 in other university departments / colleges?
Based on item C 1.1 above, many existing programs external to the COT but at BGSU may find enhanced opportunities in the DEM curriculum.

1.4 at other universities?

Collaborative opportunities may emerge based on the new curriculum consistent with other technologies and academic pursuits at several universities. Particularly online programs such as the Ph.D. in Technology Management, which the COT currently participates in with five other universities, may be a model for collaboration which DEM could follow.

2. What individuals in other departments/schools/colleges, if any, have been consulted about this proposal?

Chairs of departments providing programs and courses, as well as the dean of the COT have been intimately involved in the DEM proposal. Firelands Campus personnel in related programs have also been engaged in the change process.

3. What effect will the proposed change have on accreditation of this program or of associated programs in the college / university?

All programs in the DEM curriculum are currently accredited by the National Association of Industrial Technology (NAIT). No negative impact will be felt on NAIT accreditation, and in fact, the DEM proposal also provides a stronger base for becoming accredited by the Technology Accrediting Council-Accrediting Board for Engineering and Technology (TAC-ABET) in the future.

4. What effect will the proposed change have on the ability of the department / school / college / university to meet goals for recruitment, retention, and diversity?

The DEM proposal, once approved, strengthens opportunities for recruitment. As the new DEM program matures it is felt that retention and diversity may also be improved, particularly as the new program continues to acknowledge the importance of assessment and accomplishment of student learning outcomes.

D. STAFFING IMPLICATIONS / QUALIFICATIONS

1. Are faculty and staff with expertise available now? If not, how will they be identified/recruited?

Faculty and staff with expertise are available based on existing programs and majors. See Appendix E for an aggregate analysis of total loads as a result of this proposal.

2. How will this change affect allocation of faculty, staff in department/school/college?

The DEM proposed changes will have no affect on allocation of faculty since all are in place and fully functioning.
3. How will this change affect faculty work load?

The DEM proposed changes, when implemented, will have a positive affect on faculty work load since faculty (with the exception of the retired line indicated in D.2 above) are already in place and fully functioning. It is also true that the merger of the two programs into DEM has resulted in fewer courses to be taught in the future.

E. AVAILABILITY OF RESOURCES

1. Indicate unique space requirements for new or modified curricula, and space likely to be released by the elimination or modification of existing curricula.

Laboratories currently in place will require upgrades to match changes in DEM curriculum. Lab 124 has needed major upgrades for several years, and it is anticipated that a major development effort will be required to obtain equipment necessary to fully implement the DEM program. It is noted that significant opportunities for applied research exist, to be developed as part of the new curriculum, particularly in the new DEM 495 course, potentially leading to new industrial linkages.

2. Indicate new one-time or continuing costs for materials, equipment, services, or personnel directly associated with a new or modified curriculum. How will these costs be covered? Indicate any cost savings to be generated if an existing degree / major / minor / area of specialization is to be eliminated.

The DEM proposal brings together faculty from two majors in a way which is appropriate to the need. While no direct savings result, the DEM program is more relevant and fitting to the mission and direction of the institution. Additional costs and resources will be incurred in the future as labs are updated based on donations secured through applied research and development efforts.

3. Indicate unique library, computer, or instructional media resources that will be needed for new or modified curricula. Are they already available?

Library, computer or instructional media resources are generally available as needed to do the work associated with the DEM proposal.

F. TIMETABLE FOR IMPLEMENTATION

1. Provide a detailed timetable for events that will occur as the proposed program change is accomplished (e.g., addition or elimination of courses, hiring of faculty). The timetable for the DEM proposed implementation is as follows:

February-March, 2005—draft proposal, discussed at each department.
March-April, 2005—first, second reading by COT Undergraduate Program Council.
April-May, 2005—COT dean signs, moves to University Curriculum Council (UCC).
Spring-Summer, 2005—approval at UCC, new program implementation.
Summer-Fall, 2005—begin student recruitment process for first class of DEM.
G. OTHER INFORMATION

N/A.
Appendix A:

Proposed Design and Engineering Management Checksheet
## DESIGN and ENGINEERING MANAGEMENT Major (draft 3-17-05)

**COLLEGE OF TECHNOLOGY**

### 2005 – 2006 (to be proposed spring, 2005)

#### Cooperative Education/Project
- 12 Hrs
  - TECH 289 Co-op 4
  - TECH 389 Co-op 4
  - TECH 489 Co-op 4

#### Design and Engineering Management Core
- 39 Hrs
  - DESN 104 Design and Eng Graphics 3
  - DESN 131 Basic Comp-Aided Design 3
  - DESN 203 Advanced Comp-Aided Design 3
  - DEM 212 Intro to Des and Eng Mgmt 3
  - DEM 220 Met Materials and Processes 3
  - DEM 235 Props and Test of Eng Materials 3
  - DEM 243 Statics and Strength of Materials 3
  - DEM 330 Metrology and GDT 3
  - DEM 323 Fluid Power Transmission 3
  - QS 326 Data-based Quality Improvement 3
  - QS 427 Synchronous Quality Planning 3
  - DEM 430 Rapid Prototyping 3
  - DEM 495 Eng Syn and App Res 3

### Select A Concentration

#### Engineering Management Concentration
- 15 Hrs
  - QS 327 Process/Prod Documentation 3
  - QS 350 Genealogy of lean 3
  - QS 426 Quality Change Services 3
  - QS 450 Found of Lean Manufacturing 3
  - QS 451 Time-based Mgmt or Cont Flow 3

#### Design Concentration
- 15 Hrs
  - DESN 204 Advanced Engineering Desn 3
  - DESN 304 Mechanical Design 3
  - DESN 305 Tech Illustration 3
  - DESN 404 Adv Model Sim and Analysis 3
  - DESN 452 Design In Industry 3

#### Other Courses Required For DEM

<table>
<thead>
<tr>
<th>Category</th>
<th>Hrs</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>University</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>ENG 112</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENG 388 or BA 203 (or ENG 290**)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TECH 302**</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Math 128 or 122 + 129 or Higher</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>PHYS 201**</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>PHYS 202 **</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>STAT 200 or higher</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECON 200 **</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MGMT 305</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

#### Technical/Business Electives (by faculty advisement)
- 12 Hrs

Matriculation courses are shown in **BOLD PRINT.**

**These courses may be used to meet University BG Perspective Requirements.

### Other Courses Required For DEM

<table>
<thead>
<tr>
<th>Category</th>
<th>Hrs</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Sciences #</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Humanities &amp; Arts #</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social &amp; Behavioral Sciences #</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cultural Diversity in US #</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Core Elective #</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

*Select one international perspective course.

#See Undergraduate Catalogue.

### Summary

- Major: DEM 66 Hrs
- Other: University level courses 45 Hrs
- BG Perspective Core 24 Hrs
- Total Minimum Program Hours 123 Hrs
- Penalty hours
- Articulation Penalty Hrs
Appendix B:

Creation Or Major Changes Of Four New Courses

DEM 212: Introduction to design and engineering management
DEM 330: Metrology and geometric dimensioning and tolerancing
DEM 430: Rapid Prototyping
DEM 495: Engineering synthesis and applied research
Curriculum Modification Proposal
Change MFG 112 to Become DEM 212
Technology Systems Department
College Of Technology

A. THE MODIFICATION

1. Describe briefly the nature of the change

Change MFG 112 to become DEM 212 course to be part of the Design and Engineering Management proposal.

2. Catalog description

2.1 New catalog description

DEM 212. Introduction to Design and Engineering Management (3) Fall, spring, summer on demand. Design and engineering management systems relationships explored as prototype research and development with various materials, processes and systems. Planning, organizing and managing resources to mass produce prototype via team-based quality improvement principles, documented in portfolio using ISO/OS 9000 rubrics. Prerequisite: DESN 104, 131. Web-centric, based on equivalent 1.5 hour lecture and 3 hour laboratory per week. Extra fee.

2.2 Old catalog description

MFG 112. Introduction to Manufacturing Processes and Systems (3). Fall, Spring. Technology of the manufacturing enterprise. Production, materials, methods, manufacturing planning, organizing, and controlling. One and one-half hour lecture and one three-hour laboratory per week. Extra fee.

3. Course syllabus

A draft syllabus for the course is attached to this proposal and all appropriate #3 items are covered in the syllabus.

4. For changes to the course description and/or content of existing courses, check one:

Course content is not being changed substantially from what has been taught over the past two years. (i.e. The content will remain similar enough that the original and revised versions of the course are to be considered the same for purposes of the retake policy, for transfer equivalencies, and for degree requirements.)

5. Has the course content been offered on a trial basis under a different course number, for example under a topics course? Content has evolved in the existing MFG 112 course, with broader Design and Engineering Management changes which have been underway.

6. Is the title of the course variable? N/A

7. Is the course cross listed (credit cannot be earned for more than one of two or more courses) with any other course? If yes, list the course(s) and attach course description of affected courses. N/A

8. Is the course repeatable for earned credit? N/A

B. RATIONALE

1. Reason/need for the change

Rationale is provided by advisory committee recommendations during recent years to address programmatic changes to merge Mechanical Design and Manufactory majors. Proposed changes reflect faculty-driven shifts in Design and Engineering Management for various technical environments, underscoring the need for an increasingly electronic format, oriented to lean and quality system principles, ISO 9000 standards and portfolio assessment.
2. Student implications (describe the basis for each estimate):
   2.1 Prospective demand (level of student interest).
   Demand is consistent with what has been the case the past several years, 3-4 sections per year.
   2.2 Effect on required hours in major/minor. N/A.
   2.3 Number of students affected and in what way. N/A.
   2.4 Do you plan to request new special fees or changes in special fees? No, fees remain the same.
   2.5 Effect on elective hours in major/minor. N/A.

C. IMPLICATIONS FOR EXISTING PROGRAMS

1. For all proposals:
   a. How will the proposed change affect the demand for other courses in your department and other programs?
   The proposed modification provides no negative impact on any program in the department.
   b. When the content of a proposed course substantially overlaps another discipline, the initiator of the new course should submit letters of endorsement from the chair of the department(s) with an interest in the proposed courses. N/A.
   c. Is this course offered at Firelands College? Yes program leadership at Firelands have been aware of DEM changes.

2. Will this course change require a corresponding change in program guidelines. No, but the course is part of a broader Design and Engineering Management curriculum change, discussed elsewhere.

3. Is this course intended to satisfy one of the University General Education core requirements. No, however, it is possible that approval in some category may be sought later.

4. Is this course intended to satisfy a Group Requirement in the College of Arts & Sciences? No.

D. STAFFING IMPLICATIONS/QUALIFICATIONS

1. Are there enough faculty and staff with expertise available now? The course was taught initially by Dr. Sinn, and then by masters level graduate students and/or doctoral fellows and other faculty, mentored by Dr. Sinn.

2. How will this change affect the allocation of faculty and staff in the department/school college? Workload changes have been addressed as part of the broader Design and Engineering Management proposal, described elsewhere.

3. How will this change affect faculty work load. Faculty workload changes have been anticipated and addressed as discussed in D.2 above.

E. AVAILABILITY OF RESOURCES

1. Indicate any unique space requirements for new or modified courses, and any space likely to be released by the elimination or modification of existing courses. Proposed changes parallel broader changes described in the broader Design and Engineering Management curriculum proposal described elsewhere.

2. Indicate any unique library, computer, or instructional media resources that will be needed for new or modified courses. Are they already available? Yes, all materials are available, no changes at this time.

3. Indicate any new one-time or continuing costs for materials, equipment, services, or personnel directly associated with a new or modified course. How will these costs be covered? Indicate any cost savings to be generated if an existing course is to be eliminated. N/A.

F. OTHER INFORMATION N/A
### TECHNOLOGY SYSTEMS DEPARTMENT

**DEM 212 COURSE SYLLABUS**

Dr. John W. Sinn, Professor. jwsinn@bgnet.bgsu.edu  
www.bgsu.edu/colleges/technology/qs and  
http://www.bgsu.edu

**Lecture/laboratory** 2:30 Tuesday (until 3:50) and Thursday (until 5:20), COT 124 and 247 C; becoming increasingly electronic.

**General Bulletin Description.** DEM 212. Introduction to Design and Engineering Management (3) Fall, spring, summer on demand. Design and engineering management systems relationships explored as prototype research and development with various materials, processes and systems. Planning, organizing and managing resources to mass produce prototype via team-based quality improvement principles, documented in portfolio using ISO/QS 9000 rubrics. Prerequisite: none. Web-centric, based on equivalent 1.5 hour lecture and 3 hour laboratory per week. Extra fee.

### INSTRUCTIONAL STRATEGY, ASSESSMENT OF STUDENT LEARNING OUTCOMES, PROJECT

**Student work.** Assessment is done via a “Portfolio Outcome Assessment Matrix” (POAM), with points assigned by faculty, per outcomes and aims of course accomplished by students. All work in the course is focused on a technical project, challenging all to solve problems, communicate and write effectively, make decisions, and practice ethics and values in professional applications. Work is in teams, using coursework, documented in portfolio format for assessment (see methodological Gantt charts below).

**PROJECT PHASE I SCOPE:** Student teams research, develop and produce a product within the context of simulated production. Phase I, uses basic traditional equipment, as a portfolio reflective of a production system and environment at mid term, including:

1. Cost of product materials should be about $15; have multiple moving parts; and, be producible in COT labs.
2. General description of product to be produced, who will buy and use it, how and why.
3. Preliminary cost analysis to produce one unit of product, including break even and other related costs.
4. Cost of product materials should be about $15; have multiple moving parts; and, be producible in COT labs.
5. New layout of automated equipment, detailed process flow with correct symbols and times, work in process, inventories.
6. Final cost analysis of break-even levels in production, for 1000 products, accounting for all factors, costs in production.
7. Recommendations for general process upgrades, ROI calculations, showing costs of automated plan relative to phase I.
8. How to implement, manage new facilities determined and defined, including general maintenance systems, enhanced SOP’s.

**PROJECT PHASE II SCOPE:** Teams focus on small scale production to include multiple products. Improvements are identified based on phase I documentation, as automation and mechanization based around state of art automated equipment (part of team TRIRPA research), electronic gaging and instrumentation for inspection, and other enhancements, assembled as a cumulative portfolio of a reworked mass production system to include (all work from phase I and II):

1. Cost of product materials should be about $15; have multiple moving parts; and, be producible in COT labs.
2. General description of product to be produced, who will buy and use it, how and why.
3. Preliminary cost analysis to produce one unit of product, including break even and other related costs.
4. Digital 3-D rendering, working drawings with technical specifications required for product, and a model/prototype.
5. Personnel, layout of equipment, process flow, quality system, standard operating procedures (SOP’s) all as a management system (SOP’s are done ahead of use, for safe operation of equipment to demonstrate competence of operators).

### COURSE CONTENT AND READINGS

All required content is drawn from writings done by Dr. Sinn, in the Industrial Technologists’ Toolkit For Technical Management (ITTTM). The course draws upon the ITTTM Primer Tools 1-6, further defined below in remainder of table, and based on applications of content for tool research when applications are done for project, shown as final table.

**Tool 1: ”Technical Foundations For Industry And Technology”**

**Tool 2: “Materials and Processes”**

**Tool 3: ”Process Engineering, Design And Innovation”**

**Tool 4: ”Cost Analysis And Productivity Improvement”**

**Tool 5: ”Quality Systems”**

**Tool 6: ”Automation And Computer Integration”**


### PORTFOLIO OUTCOME ASSESSMENT MATRIX (POAM)

POAM integrates course student learning outcomes, and course aims, into project portfolio work based on team submissions shown in course rollout. POAM is attached to each main assignment done by teams to communicate progress in meeting outcomes, aims. General issue areas (GIA) show points as a total team evolving toward best practices (participants may receive different points).

**Outcome 1, Communications: Good communication practices are reflected in all work, ultimately as team portfolio.**

<table>
<thead>
<tr>
<th>Outcome, aims general assessment, reflect researcher/compiler/team management in work supplied, completed.</th>
<th>GIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Portfolio system shows good management, writing quality, effectively organized to communicate project work</td>
<td></td>
</tr>
<tr>
<td>b) Supplier, customer documentation in discussion board, chats, adds short and long term value to project and portfolio</td>
<td></td>
</tr>
<tr>
<td>c) Power point “short form” presentation evolves (3-5 slides) to summarize, explain, compliment “long form” portfolio</td>
<td></td>
</tr>
<tr>
<td>d) Forms, chats, threads show good team management, responsibilities balanced, doing early posts, compiling, rotating</td>
<td></td>
</tr>
</tbody>
</table>

GIA improvement feedback, including persons not fully supporting, total points earned (8/16 possible) as a team in final post:

<table>
<thead>
<tr>
<th>Outcome 2, Review of literature: Literature, information reviewed and abstracted supports, grows ideas, knowledge.</th>
<th></th>
</tr>
</thead>
</table>
Outcome, aims general assessment, reflect researcher/compiler/team management in work supplied, completed.

GIA improvement feedback, including persons not fully supporting, total points earned (4/8 possible) as a team in final post:

Outcome 3, Content and tool applications: Organize, apply, document knowledge via course content as solutions to project.

GIA improvement feedback, including persons not fully supporting, total points earned (6/12 possible) as a team in final post:

Outcome 4, Research methodology: A structured, intentional research plan is designed and implemented.

GIA improvement feedback, including persons not fully supporting, total points earned (4/8 possible) as a team in final post:

Outcome 5, Project management: Resources well managed to make effective decisions, improve professional practices.

GIA improvement feedback, including persons not fully supporting, total points earned (8/16 possible) as a team in final post:

**Other general feedback/information for team:**

Team Assessed: Assessor: Work Assessed: Date: Team Points:

---

**ASSESSMENT SYSTEMS POINTS SUMMARY**

All course activities; startup, discussions/chats, postings and general electronic functions; generate points and contribute to individual, team grades. Points are assigned, and feedback offered as a numerical indicator of performance, ultimately as a grade.

<table>
<thead>
<tr>
<th>Student Activity</th>
<th>% Weight</th>
<th>*Potential Points?</th>
<th>How Many, Other?</th>
<th>*When?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two phased project</td>
<td>32 %</td>
<td>60 points each, 120 total</td>
<td>2 phases</td>
<td>Mid term, final</td>
</tr>
<tr>
<td>Tool research</td>
<td>42 %</td>
<td>30 points each, 180 total</td>
<td>6 tools (two week posting cycle)</td>
<td>Each presentation</td>
</tr>
<tr>
<td>Chats</td>
<td>11 %</td>
<td>6 points each, 48 total</td>
<td>8 (attendance/participation)</td>
<td>In Blackboard</td>
</tr>
<tr>
<td>Threads, compiling</td>
<td>11 %</td>
<td>6 points each, 48 total</td>
<td>8 (attendance/participation)</td>
<td>In Blackboard</td>
</tr>
<tr>
<td>Start-up</td>
<td>4 %</td>
<td>18 points</td>
<td>1 required per team</td>
<td>Start of course</td>
</tr>
</tbody>
</table>

Top team score is top of curve, equal to 100%. *Work posted late receives less credit, according to dates in course rollout.

**Plagiarism, Proprietary Information, Portfolios.** All must assure that information is handled properly, as intellectual property, giving appropriate credit for information belonging to others (see [www.bgsu.edu/courses/library/infosrv/lue/plagarism.html](http://www.bgsu.edu/courses/library/infosrv/lue/plagarism.html)). Students not wishing to share information in portfolios with others should inform instructor during initial course stages.

---

**COURSE ROLLOUT AND OTHER GENERAL INFORMATION**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date (s)</th>
<th>Student Activities</th>
<th>Other, General Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8-23/27</td>
<td>Start-up Activities</td>
<td>Build team; Do Start-up; Meet online; Work physically, electronically, posting</td>
</tr>
<tr>
<td>2</td>
<td>8-30</td>
<td>Start-up done, chat</td>
<td>Complete Startup; Electronic required chat done; Tool 1 focus, review, debrief</td>
</tr>
<tr>
<td>3</td>
<td>9-10</td>
<td>Present Toolkit 1</td>
<td>Post tool 1 in Blackboard (12:00 PM); Start tool 2; first half posting cycle review</td>
</tr>
<tr>
<td>4</td>
<td>9-13/17</td>
<td>Discuss Tool 1, chat</td>
<td>Team improving around product focus; encourage team chat; Finish tool 2</td>
</tr>
<tr>
<td>5</td>
<td>9-24</td>
<td>Present Tool 2</td>
<td>Post tool 2 work in Blackboard by 12:00 PM; Start tool 3; Building prototypes</td>
</tr>
<tr>
<td>6</td>
<td>9-27/10-1</td>
<td>Discuss Tool 2, chat</td>
<td>Team improves, prototype developing; first half post/cycle review, finish tool 3</td>
</tr>
<tr>
<td>7</td>
<td>10-8</td>
<td>Present Tool 3</td>
<td>Post tool 3 work by 12:00 PM; doing phase I production plan, finalize prototypes</td>
</tr>
<tr>
<td>8</td>
<td>10-11/15</td>
<td>Discuss Tool 3, chat</td>
<td>Optional extra credit phase pre-post, first half post cycle review; debrief teams</td>
</tr>
<tr>
<td>9</td>
<td>10-22</td>
<td>Present Phase 1</td>
<td>Start tool 4; Prototypes done, production plan posted as phase I, 12:00 PM</td>
</tr>
<tr>
<td>10</td>
<td>10-25/29</td>
<td>Discuss Phase 1</td>
<td>Do tool 4; Plan Phase II; Begin product mass production</td>
</tr>
<tr>
<td>11</td>
<td>11-5</td>
<td>Present Tool 4</td>
<td>Post tool 4 work, 12:00 PM, Start tool 5; Finish tool 4; Planning mass production</td>
</tr>
<tr>
<td>12</td>
<td>11-8/12</td>
<td>Discuss Tool 4, chat</td>
<td>Conduct production, refine phase I; first half posting cycle review of tool 5</td>
</tr>
<tr>
<td>13</td>
<td>11-19</td>
<td>Present Tool 5</td>
<td>Post tool 5 work by 12:00 PM, Start tool 6; Finish tool 5; Doing mass production</td>
</tr>
</tbody>
</table>
ISO Quality Elements, BGSU Core Values, Metrics Synthesized As Course Student Learning Outcomes

As part of the course instructional strategy, and assessment, metrics define important attributes to measure, audited in the ISO/QS quality systems environment. As a major component in engineering management, particularly reflecting global standards for the technical workplace, the metrics are provided to assist all in better understanding the derivation of outcomes and aims in courses. Further, the broad metrics identified in the course assist all in understanding general context of outcomes which will be audited, or assessed, in portfolios. Metrics are presented as ISO quality elements and BGSU core values from the collegial and university levels, in a synthesized matrix format.

<table>
<thead>
<tr>
<th>ISO Quality Element</th>
<th>BGSU Core Values, College/University</th>
<th>Course Student Learning Outcomes, To Be Assessed Via POAM, Integrating Course Aims (See POAM Above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality management system</td>
<td>Analysis, cultural, global views, values</td>
<td>Outcome 1, Communications: Good communication practices are reflected in all work, ultimately as team portfolio.</td>
</tr>
<tr>
<td>Management responsibility</td>
<td>Integration; pragmatic field information applied</td>
<td>Outcome 2, Review of literature: Literature, information reviewed and abstracted supports, grows ideas, knowledge.</td>
</tr>
<tr>
<td>Product realization</td>
<td>Disciplined knowledge; R &amp; D; problem solving</td>
<td>Outcome 3, Content and tool applications: Organize, apply, document knowledge via course content as solutions to project.</td>
</tr>
<tr>
<td>Measurement analysis, improvement</td>
<td>Communication, decision making, systems</td>
<td>Outcome 4, Research methodology: A structured, intentional research plan is designed and implemented.</td>
</tr>
<tr>
<td>Resource management</td>
<td>Interaction, articulated knowledge, organized improvement</td>
<td>Outcome 5, Project management: Resources well managed to make effective decisions, improve professional practices.</td>
</tr>
</tbody>
</table>
A. THE MODIFICATION

1. For all proposals: Describe briefly the nature of the proposed change. This proposes creation of the course DEM 330, Metrology and GD & T

2. New catalog description for new or altered courses

3. For any new course or substantial changes in course content: Provide a syllabus, including all of the following: Please see attached syllabus (items 3.1 through 3.8 are covered in the syllabus).

4. For changes to the course description and/or content of existing courses, check one: N/A

5. Has the course content been offered on a trial basis under a different course number, for example under a topics course? □ yes X □ no

6. Is the title of the course variable? □ yes X □ no

7. Is the course cross listed (credit cannot be earned for more than one of two or more courses) with any other course? □ yes X □ no

8. Is the course repeatable for earned credit? □ yes X □ no

B. RATIONALE [Required for all proposals]

1. Reason/Need for the change.
   This course is being created as part of DEM in the COT. The students in this curriculum need the knowledge of contemporary measurement standards and practices within the integrated field of design and engineering management. Alumni will work mainly in the manufacturing, design and quality fields.

2. Student implications (describe the basis for each estimate):
   2.1 Prospective demand (level of student interest).
   This will be a required course in the new curriculum. Demand for the course will increase along with enrollment in the new major. Based on the enrollment of design and manufacturing majors, it is estimated that the initial demand for the course will be 10-15 students per year.

   2.2 Effect on required hours in major / minor.
   Please see 2.1 above.

   2.3 Number of students affected and in what way.
   Please see 2.1 above.

   2.4 Do you plan to request new special fees or changes in special fees? (A separate request for special fees is required. Contact College Office for form and attach copy.)
   Yes there will be a lab fee required for this course, consistent with courses of this nature (appropriate documentation is included in this proposal).
2.5 Effect on elective hours of majors / minors.

It is anticipated that students from other majors will not take this course, creating no effect.

C. IMPLICATIONS FOR EXISTING PROGRAMS

1. For all proposals:
   a. How will the proposed change affect the demand for other courses in your department and for courses in other programs? **There should be no change, since course is not required by other majors.**
   b. When the content of a proposed course substantially overlaps another discipline, the department proposing the new course should submit letters of endorsement from the chair of the department(s) with an interest in the proposed courses. **The course content does not overlap with other areas.**
   c. Is this course offered at Firelands College? □ yes X □ no If so, please provide evidence of notification of the appropriate Firelands department.

2. For all proposals: Will this course change require a corresponding change in program guidelines (e.g. addition of the course to a checksheet)? X Yes □ No If “yes,” please submit a separate Curriculum Modification Request explaining how the course change impacts program requirements. **The course forms part of the new DEM curriculum as addressed throughout the broader proposal.**

3. For a new course: Is this course intended to satisfy one of the University General Education core requirements? □ yes XX no If so, in which area? N/A

4. For a new course: Is this course intended to satisfy a Group Requirement in the College of Arts & Sciences? N/A

D. STAFFING IMPLICATIONS / QUALIFICATIONS

1. For a new course, or if an existing course is to be modified: Are there enough faculty and staff with expertise available now? X yes □ no (You may consider other related modifications in addressing this question.)

2. For all proposals: How will this change affect allocation of faculty and staff in the department / school / college? **No changes are anticipated based on restructuring outlined in the broader DEM proposal.**

3. For all proposals: How will this change affect faculty work load? **Changes created by adding this course are being addressed as indicated in the broader DEM proposal.**

E. AVAILABILITY OF RESOURCES

1. Indicate any unique space requirements for new or modified courses, and any space likely to be released by the elimination or modification of existing courses. **No Changes**

2. Indicate any unique library, computer, or instructional media resources that will be needed for new or modified courses. Are they already available? Yes

3. Indicate any new one-time or continuing costs for materials, equipment, services, or personnel directly associated with a new or modified course. **No Changes**

F. OTHER INFORMATION

1. Provide other information that may be helpful in the review process, as appropriate.
DRAFT
COLLEGE OF TECHNOLOGY
COURSE SYLLABUS

COURSE/INSTRUCTOR DATA
DEM 330 Metrology and GD & T  S. Jetley, Room 214 TB
Dept. Office 2-2608
3 Credit Hours    sjetley@bgnet.bgsu.edu

GENERAL BULLETIN DESCRIPTION

GENERAL COURSE DESCRIPTION
The course is intended to teach principles of metrology, use of measuring instruments, Interpreting and assigning geometric tolerances to mechanical parts. Students will learn the importance of measurement and standardized tolerancing as well as potential problems in measurement. Therefore the students will learn about CMMs, computer vision, Surface finish, laser metrology, Limits and fits, ASME Y14 GD& T Standards, Reverse Engineering and Gage R & R. Students will be given reading assignments to provide a wider perspective than covered in class.Students will be given problem solving exercises as homework, as well as lab assignments.

COURSE OBJECTIVES
Student learning outcomes include, at the conclusion of the course students will:
- Be able to define the basic principle of metrology
- Be able to identify and know about the usage and construction of measuring instruments.
- Be able to use computer vision at a basic level
- Be able to interpret and assign Geometric tolerancing to engineered parts
- Be able to calculate accumulated tolerances at a basic level
- Be able to identify the role and procedures of reverse engineering in industry
- Be able to conduct a gage R & R Study
- Be able to make verbal and written presentations

Instructional strategies
Students will be taught using lectures, lab. Exercises, Classroom Discussions and using a 4 week long project

Student learning activities
Students learning activities will include doing weekly homework assignments, weekly readings, conducting independent study to support a project and studying for tests

Procedures for evaluating student performance
Students will be evaluated through the quality of their lab. Reports, Project report and presentation, home work assignments and formal tests.

Plan for assessing student learning outcomes in this course
Students will be given assignments, both as homework and lab work, that directly relate to the student learning outcomes. The tests will also be created to assess their learning. Their performance in these assignments and tests will thus be the assessment of their learning outcomes.
Evaluation Scheme

<table>
<thead>
<tr>
<th>Evaluation Scheme</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework and assignments</td>
<td>40</td>
</tr>
<tr>
<td>Test 1</td>
<td>10</td>
</tr>
<tr>
<td>Test 2</td>
<td>10</td>
</tr>
<tr>
<td>Final Comprehensive</td>
<td>20</td>
</tr>
<tr>
<td>Project</td>
<td>20</td>
</tr>
</tbody>
</table>

COURSE OUTLINE/SCHEDULE
Students will be asked to conduct a small GD & T Project

WEEK #

1. Introduction to basis of metrology and tolerencing.
2. Limits and Fits
3. CMMs
4. Laser metrology and manual instruments
5. Gage R & R
6. Datums and GD & T Symbology
7. Tolerencing and measurement of Form
8. Test 1. Tolerencing and measurement of Orientation
9. Tolerencing and measurement of form/orientation combinations DFMA
10. Position tolerancing
11. Position tolerancing
12. Test 2. Computer vision
13. Computer vision
14. Reverse engineering
15. Project Presentations
16. Final Exam and Project Presentations

READING MATERIALS

Textbook

Geometric Dimensioning and Tolerancing by David Madsen, 2001, Good heart- Wilcox

Selected References

Image Pro manual

Fundamental of Dimensional Metrology by T. Busch etal., Delmar, 1989

Geometric Dimensioning and Tolerancing, Applications and Inspection by G. Griffith, 2002, Prentice

ASME GD & T Standard

COURSE MATERIALS

Approved industrial-quality eye protection (ANSI Z2, 1-1959) is required for the course and must be worn at all times while in the laboratory.

Necessary consumable materials are available from the Technology Stores/Toolroom (Room 123). A hand-held calculator will be helpful.

ACADEMIC HONESTY
The Academic Honesty Committee has set forth the following objectives and procedures regarding academic honesty.

Objectives

1. To communicate to all members of the University community the conviction of the University and its faculty that cheating and plagiarism are destructive of the central purposes of the University and are universally disapproved.

2. To state procedures for accomplishing the above objective by students, faculty, academic deans, and University Academic Honesty Committee. For the complete statement, refer to: General Bulletin, Appendix 1 (Board of Trustees, 1979).

SUPPLEMENTAL INFORMATION

Attendance

University policy provides that the instructor has no obligation to give makeup exams or provide additional time to make up missed work resulting from absence from class. If you are absent for an exam or miss an important assignment, a makeup will be allowed only if you provide a written explanation from a doctor, employer, or other significant source.

Repeating the Course

If you are repeating this course, be certain you complete a "Repeat-a-Course" card at the Registrar's Office.

S/U Grading

If you intend to take this course on an S/U basis, be certain you register your intent at the Registrar's Office at an early date. Your instructor has no way of knowing if you are registered for S/U rather than a regular letter grade.
COURSE FEE REQUEST FORM

Academic Unit       Technology Systems

DEM 3XX Metrology and GD & T.

Course No. and Title

X  First time Request  _____ Request for Change

_____ Proposed Fee    _____ Current Fee    _____ Date of Last Change

_____ Proposed Fee    _____ Amount of Last Change

Supporting Rationale (Be specific: projected income and costs must be provided)

The course fee is an estimate, based on other courses. The students will be conducting lab. Exercises as well as doing CAD work.

(Attach additional page if needed)

Chair/Director's Recommendation:

_____ Recommended    _____ Not Recommended

Signature of Chair/Director  Date

Dean's Recommendation:

Comments:

_____ Recommended    _____ Not Recommended

Signature of Dean  Date

VPAA Action:

_____ Recommended    _____ Not Recommended

Signature of VPAA  Date

Trustees Action:

_____ Approved    _____ Not Approved  Date:

forms\coursefeerequest
February 3, 1994
Curriculum Modification Proposal
Change MFG 430 to DEM 430
Technology Systems Department
College Of Technology

A. THE MODIFICATION

1. For all proposals: Describe briefly the nature of the proposed change.

   The proposed change is in title and prefix only for MFG 430, Concurrent Manufacturing Technology to become DEM 430, Rapid Prototyping.

2. Describe catalog description.

   2.1 New catalog description for new or altered courses


   2.2 Old catalog description, if an existing course is being changed.

   MFG 430. Concurrent Manufacturing Technology (3). Spring, and on demand. Contemporary manufacturing processes in which the process of producing a newly designed product is expedited on Computer-Aided Design/Computer Aided Manufacturing (CAD/CAM). Four hours of lecture and laboratory per week. Prerequisites: MFG 112, MFG 220, and MFG 340, DESN 131 and DESN 204. Extra fee.

3. For any new course or substantial changes in course content: Provide a syllabus, including all of the following:

   NA.

   3.1 Course aim
   3.2 Student learning outcomes
   3.3 Course content
   3.4 Instructional strategies
   3.5 Student learning activities
   3.6 Procedures for evaluating student performance
   3.7 Plan for assessing student learning outcomes in this course
   3.8 List a sample of library resources needed to support this course.

4. For changes to the course description and/or content of existing courses, check one:
x Course content is not being changed substantially. (i.e. The content will remain similar enough that the original and revised versions of the course are to be considered the same for purposes of the retake policy, for transfer equivalencies, and for degree requirements.)

☐ Course content is being changed substantially. If checked, answer the following:

x yes ☐ no -- Students may receive credit toward graduation for both the former version of the course and the revised version of the course.

☐ yes x no -- Transfer credit equivalencies should be re-evaluated.

5. Has the course content been offered on a trial basis under a different course number, for example under a topics course? If yes, which course and under what title? NA

☐ yes

x no

6. Is the title of the course variable?

☐ yes

x no

7. Is the course cross listed (credit cannot be earned for more than one of two or more courses) with any other course? If yes, list the course(s) and attach course description of affected courses.

☐ yes

x no

8. Is the course repeatable for earned credit? ☐ yes ☐ no If yes, under what circumstances and up to how many hours? (for example, is it only repeatable if the topics differ?)

B. RATIONALE [Required for all proposals]

1. Reason/Need for the change.
   This title and prefix is being changed as part of the new DEM major in the college. There is no change in the course content since the two courses were essentially the same. Alumni of this major will be expected to work mainly in the manufacturing and design fields. The emphasis and the course name are changed to reflect this.

2. Student implications (describe the basis for each estimate):

   2.1 Prospective demand (level of student interest).
       No change. Based on the enrollment of our design and manufacturing majors, it is estimated that the initial demand for the course will be 10-15 students per year.

   2.2 Effect on required hours in major / minor.
       Please see 2.1 above.

   2.3 Number of students affected and in what way.
       Please see 2.1 above.

   2.4 Do you plan to request new special fees or changes in special fees? (A separate request for special fees is required. Contact College Office for form and attach copy.)
       No change

   2.5 Effect on elective hours of majors / minors.
       There should be no effect.

C. IMPLICATIONS FOR EXISTING PROGRAMS
1. For all proposals:
   a. How will the proposed change affect the demand for other courses in your department and for courses in other programs? There should be no change.

   b. When the content of a proposed course substantially overlaps another discipline, the department proposing the new course should submit letters of endorsement from the chair of the department(s) with an interest in the proposed courses. The course content does not overlap with other areas.

   c. Is this course offered at Firelands College? □ yes  x no  If so, please provide evidence of notification of the appropriate Firelands department.

2. For all proposals: Will this course change require a corresponding change in program guidelines (e.g. addition of the course to a checksheet)?  X Yes  __ No  If “yes,” please submit a separate Curriculum Modification Request explaining how the course change impacts program requirements.

   The course forms part of the new major and appropriate curriculum modification requests being submitted.

3. For a new course: Is this course intended to satisfy one of the University General Education core requirements?  □ yes  x no  If so, in which area?

4. For a new course: Is this course intended to satisfy a Group Requirement in the College of Arts & Sciences?  __ Yes _x No  If yes, in which area? ________________________________

D. STAFFING IMPLICATIONS / QUALIFICATIONS

1. For a new course, or if an existing course is to be modified: Are there enough faculty and staff with expertise available now?  X□ yes  □ no (You may consider other related modifications in addressing this question.)

2. For all proposals: How will this change affect the allocation of faculty and staff in the department / school / college?
   It is part of the restructuring of the faculty assignments consistent with the DEM proposal.

3. For all proposals: How will this change affect faculty work load? The faculty load is governed by the college guidelines, which will be followed.

E. AVAILABILITY OF RESOURCES

1. Indicate any unique space requirements for new or modified courses, and any space likely to be released by the elimination or modification of existing courses. No Change

2. Indicate any unique library, computer, or instructional media resources that will be needed for new or modified courses. Are they already available? Yes

3. Indicate any new one-time or continuing costs for materials, equipment, services, or personnel directly associated with a new or modified course. How will these costs be covered? Indicate any cost savings to be generated if an existing course is to be eliminated. No Change

F. OTHER INFORMATION

1. Provide other information that may be helpful in the review process, as appropriate.
COURSE AND INSTRUCTOR DATA
Course: DEM 430    Instructor: Dr. T. C. Waggoner
Rapid Prototyping    Office: Room 209
Prerequisites: DESN 131, DEM 212, DEM 220, DEM 330    Ph: 372-2633


COURSE GOAL AND OBJECTIVES
Course Goal

The course goal is to expose the student to a simultaneous engineering function similar to those found in industry. This will be done within a quality environment, focused on bringing product to market most efficiently.

Note: We will start the course by reviewing CAD and blending that review of CAD into becoming a proficient CAM user (in this case MasterCAM). Later- solid modeling and animation strategies will be developed.

Course Objectives

At the completion of the course the student will be able to:

1. Use CAD drawings in DXF formats and produce CAM-developed CNC programs to produce machined parts in 2 axis, 2 1/2 axis and 3 axis (and beyond) CNC machine parameters.

2. Manipulate CAD and CAM geometry by using operations like filleting, trimming, and developing surfaces from wireframe geometry.

3. Produce a solid model of a complex assembly (that is ready for animation). Note: Animation may be considered a partial measure of this objective.

4. Develop detail drawings of the solid model focused on manufacturing.

5. Simultaneously produce the tooling, models, detail drawings, and engineering changes to the solid model as the design develops.
6. To synthesize the CAD and CAM aspects of the course into a quality system which assures that quality is engineered into the product and maintained during manufacture, and over the product's service life.

COURSE REQUIREMENTS

1. Complete assigned reading and homework projects.
2. Complete assigned laboratory projects.
3. Complete Quizzes, Mid Term, Final, and other assigned written work.

COURSE MATERIALS

1. Safety Glasses (for laboratory and possible industrial observations).
2. Calculator (may be helpful).
3. Floppy Disks
4. Memory Sticks (Encouraged)

LABORATORY CHARGE

There is a laboratory charge for the course that will be discussed.

STUDENT EVALUATION

Course grades will be based on the following weighting:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Assignments</td>
<td>300</td>
</tr>
<tr>
<td>Research Project</td>
<td>200</td>
</tr>
<tr>
<td>Mid Term</td>
<td>150</td>
</tr>
<tr>
<td>Final</td>
<td>250</td>
</tr>
<tr>
<td>Quizzes</td>
<td>100</td>
</tr>
</tbody>
</table>

1000 Points Total

Note: This class adheres to a cleanup policy. All students will remain and participate in cleaning the laboratory until a cleanup attendance is taken. Those leaving prior to this time (unless exempted by the instructor for special circumstances) will have 50 points deducted from their final grade total or may choose to clean the laboratory after the next session.

Grades will be based on the following scale:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000-900</td>
<td>A</td>
</tr>
<tr>
<td>899-800</td>
<td>B</td>
</tr>
<tr>
<td>799-700</td>
<td>C</td>
</tr>
<tr>
<td>699-600</td>
<td>D</td>
</tr>
<tr>
<td>599-</td>
<td>F</td>
</tr>
</tbody>
</table>

READING MATERIALS

Texts
Academic Honesty

The Academic Honesty Committee has set forth the following objectives and procedures regarding academic honesty:

Objectives
1. To communicate to all members of the University community the conviction of the University and its faculty that cheating and plagiarism are destructive of the central purposes of the University and are universally disapproved.

2. To state procedures for accomplishing the above objective by students, faculty, academic deans, and the University Academic Honesty Committee. For the complete statement refer to: The Faculty Handbook or The Student Code.

Attendance
When students are absent from class, even when it is due to a field trip or other sponsored University event, it is entirely the student's responsibility to notify each of his or her professors and determine if work can be made up. Participation in a field trip or event does not mean that the student is excused from his/her classes until and unless the professors in the missed classes excuses them.

Course Content Outline

<table>
<thead>
<tr>
<th>Session</th>
<th>Lecture/Topics</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction Review of CAD (AutoCAD)</td>
<td>•AutoCAD Assignment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Review of CAD (AutoCAD)</td>
<td>•AutoCAD Assignment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SolidWorks Tutorial #1</td>
<td>•SolidWorks Assignment #1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SolidWorks Tutorial #2</td>
<td>Quiz I</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SolidWorks Tutorial #3</td>
<td>SolidWorks Assignment #2</td>
</tr>
<tr>
<td></td>
<td>Course</td>
<td>Additional Information</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>SolidWorks AutoLISP Programming</td>
<td>Rapid Prototyping Exercise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• AutoLISP Program</td>
</tr>
<tr>
<td>7</td>
<td>2-D Basic Algor</td>
<td>2-D Algor Exercise</td>
</tr>
<tr>
<td>8</td>
<td>Mid Term</td>
<td>Programming Assignment</td>
</tr>
<tr>
<td>9</td>
<td>MasterCAM 2-D</td>
<td>• Milling Square</td>
</tr>
<tr>
<td>10</td>
<td>MasterCAM 2-D</td>
<td>• Drilling Square</td>
</tr>
<tr>
<td>11</td>
<td>MasterCAM 2-D Quiz II</td>
<td>• Geneva Wheel (DXF) CAM Exercise</td>
</tr>
<tr>
<td>12</td>
<td>MasterCAM 3-D</td>
<td>• 3-D Mastercam Part</td>
</tr>
<tr>
<td>13</td>
<td>Advanced ALGOR</td>
<td>• Algor Solids</td>
</tr>
<tr>
<td>14</td>
<td>2-D and 3-D Reverse Engineering</td>
<td>• 3-D Mastercam Part</td>
</tr>
<tr>
<td>15</td>
<td>MasterCAM</td>
<td>• Concurrent Engineering</td>
</tr>
<tr>
<td>16</td>
<td>Final Examination</td>
<td>Laboratory Practical</td>
</tr>
</tbody>
</table>

The instructor reserves the right to amend the syllabus.
A. THE MODIFICATION

1. Describe briefly the nature of the change

This proposes creation of a new course, DEM 495, to be used as a capstone engineering synthesis and applied research experience for undergraduate students.

2. Catalog description

DEM 495. Engineering Synthesis and Applied Research (3) All terms. Faculty directed collaborative industrial or technical applied research which may be conducted in concert with cooperative education experience(s), independently or in teams, to be documented with written technical research report, presented in seminar and/or other format.

3. Course syllabus

A draft syllabus for the new course is attached to this proposal with all #3 items covered.

4. For changes to the course description and/or content of existing courses, check one: NA.

5. Has the course content been offered on a trial basis under a different course number, for example as a topics course? If yes, which course and under what title?

Yes, the proposed DEM 495 has been prototyped under various titles and in various ways over the years. This includes 490’s in all majors, TECH 480 and TECH 389/489. Offering in this way has suggested the need for a more specifically designed engineering synthesis and applied research course such as DEM 495.

Perhaps the most extensive and systematic exploration of the DEM 495 engineering synthesis and applied research methods and systems occurred through the former Center for Quality, Measurement and Automation in the mid 1990’s. Various funded work was accomplished with undergraduate students in engineering synthesis and applied research projects during this period.

6. Is the title of the course variable? No.

7. Is the course cross listed (credit cannot be earned for more than one of two or more courses) with any other course? If yes, list the course (s) and attach course description of affected courses. No.

8. Is the course repeatable for earned credit? No.

B. RATIONALE

1. Reason/need for the change
The proposed changes reflect shifts in technology and various industries, underscoring the need for an increasingly technical and disciplined engineering synthesis and applied research orientation and preparation. The changes are also consistent with recent strategic planning at the university and in the College of Technology calling for applied research expertise and professional preparation. The changes are also reflected in the DEM broader proposal which the DEM 495 course is part of.

Specific reasons for the new course are also reflected in the following needs of students. Students need:

- Experience in conducting, organizing and reporting applied research.
- Application of theoretical and technical knowledge in a research and synthesis environment.
- Work in teams, and/or with industrial/academic mentor(s), to solve robust technical problems.

It is also acknowledged that experiences gained in undergraduate level engineering synthesis and applied research may be beneficial in helping prepare some students for graduate work.

2. Student implications (describe the basis for each estimate):

   2.1 Prospective demand (level of student interest).
       It is anticipated that demand may be 5-10 students in the early stages, and that this will grow over time as the DEM curriculum is used by increasing numbers of students.
   2.2 Effect on required hours in major/minor. N/A.
   2.3 Number of students affected and in what way.
       See item 2.1 above, and, no negative effects are anticipated.
   2.4 Do you plan to request new special fees or changes in special fees? No.
   2.5 Effect on elective hours in major/minor. N/A.

C. IMPLICATIONS FOR EXISTING PROGRAMS

1. Integration and relationship of modification with/to other offerings, including effect on demand for courses in other programs

   a. How will the proposed change affect the demand for other courses in your department and for courses in other programs? No changes are anticipated based on the DEM 495 course.

   b. When the content of a proposed course substantially overlaps another discipline, the individual proposing the new course should submit letters of endorsement from the chair of the department(s) with an interest in the proposed courses. NA.

   c. Is this course offered at Firelands College? No.

2. Will this course change require a corresponding change in program guidelines. NA.

3. Is this course intended to satisfy a University General Education core requirement. No.

4. Is this course intended to satisfy a group requirement in the College of Arts & Sciences? No.

D. STAFFING IMPLICATIONS/QUALIFICATIONS

1. Are there enough faculty and staff with expertise available now? Yes, this course will be shared among various DEM related faculty in Manufacturing and Mechanical Design.
2. How will this change affect the allocation of faculty and staff in the department/school college? See item D 1 above.

3. How will this change affect faculty work load. See item D 1 above. Also note that this course may lead to changes in numbers and types of applied research projects conducted by faculty, with students, resulting in changing patterns in work load over time.

E. AVAILABILITY OF RESOURCES

1. Indicate any unique space requirements for new or modified courses, and any space likely to be released by the elimination or modification of existing courses. It is anticipated that equipment and other resource needs will be met by local/regional industries or existing program labs. Necessary administrative functions and needs for projects will be met by existing offices, consistent with current applied research approaches. It is particularly anticipated that linkages with the COT’s Center for Applied Technology will be engaged in the linkages and relationships which may emerge.

2. Indicate any unique library, computer, or instructional media resources that will be needed for new or modified courses. Are they already available? Yes, see item E 1 above.

3. Indicate any new one-time or continuing costs for materials, equipment, services, or personnel directly associated with a new or modified course. How will these costs be covered? Indicate any cost savings to be generated if an existing course is to be eliminated. Yes, see item E 1 above.
COURSE INSTRUCTOR DATA

DEM 495
Engineering Synthesis and Applied Research
4 Credit Hours

COURSE AIM

DEM 495. Engineering Synthesis and Applied Research (3) All terms. Faculty directed collaborative industrial or technical applied research which may be conducted in concert with cooperative education experience(s), independently or in teams, to be documented with written technical research report, presented in seminar and/or other format.

STUDENT LEARNING OUTCOMES

Anticipated outcomes for the course are:

1. Experience in conducting, organizing, synthesizing and reporting applied research.
2. Application of theoretical technical knowledge in a research and synthesis environment.
3. Work in teams, and/or with industrial/academic mentor(s), to solve robust technical problems.

INSTRUCTIONAL STRATEGY (including student learning activities and assessment)

Requirements will vary for students and teams as directed by their own technical applied research project. Common instructional requirements to assure student learning and assessment of outcomes include:

1. Work with faculty and/or practicing professionals to identify and develop a project.
2. Conducting a project under supervision one or more faculty advisor(s) and/or industrial liaison.
3. Providing regular project updates via technical presentations in a seminar or other type format.
4. Writing and presenting a final report incorporating the following contents (anticipated to be managed and organized by teams for presentation in various formats and forums):
   
   Chapter 1, context of the problem, objectives
   Chapter 2, background and theory
   Chapter 3, methodology
   Chapter 4, findings and analysis
   Chapter 5, conclusions, recommendations and observations

COURSE CONTENT TEXT

No specific content or text will be used. Rather, various forms of text, scholarly articles, and other technical documentation, as appropriate for the specific engineering synthesis and applied research project under
investigation, will be pursued by each student or team under the tutelage of faculty, the industrial liaison and others.

Appendix C:

Changing Eight Existing Courses, Prefixes Only

MFG 350: Genealogy of lean
MFG 451: Time-based management or continuous flow
MFG 450: Foundations of lean manufacturing
MFG 220: Metallic materials and processes
MFG 235: Properties and testing of engineering materials
DESN 243: Statics and strength of materials
TECH 323: Fluid power transmission
MFG 322: Non-metallic materials and processes I

To

QS 350: Genealogy of lean
QS 451: Time-based management or continuous flow
QS 450: Foundations of lean manufacturing
DEM 220: Metallic materials and processes
DEM 235: Properties and testing of engineering materials
DEM 243: Statics and strength of materials
DEM 323: Fluid power transmission
TECH 322: Non-metallic materials and processes I
Curriculum Modification Proposal
Change Selected MFG, DESN and TECH courses to DEM Prefixes
Technology Systems Department
College Of Technology

A. THE MODIFICATION

1. Describe briefly the nature of the change

Selected MFG, DESN and TECH course prefixes are proposed to be changed to DEM, consistent with broader changes as part of the Design and Engineering Management proposal. Three courses are changed to the QS prefix from MFG; two courses are changed to the DEM prefix from MFG; one DESN course is changed to the DEM prefix; one TECH course is changed to the DEM course; and one MFG course is changed to the TECH prefix.

2. Catalog description

2.1 New catalog description

QS 350: Genealogy of lean
QS 451: Time-based management or continuous flow
QS 450: Foundations of lean manufacturing
DEM 220: Metallic materials and processes
DEM 235: Properties and testing of engineering materials
DEM 243: Statics and strength of materials
DEM 323: Fluid power transmission
TECH 322: Non-metallic materials and processes I

2.2 Old catalog description

MFG 350: Genealogy of lean
MFG 451: Time-based management or continuous flow
MFG 450: Foundations of lean manufacturing
MFG 220: Metallic materials and processes
MFG 235: Properties and testing of engineering materials
DESN 243: Statics and strength of materials
TECH 323: Fluid power transmission
MFG 322: Non-metallic materials and processes I

3. Course syllabus NA.
4. For changes to the course description and/or content of existing courses, check one: NA
5. Has the course content been offered on a trial basis under a different course number, for example under a topics course? If yes, which course and under what title? NA.
8. Is the title of the course variable? NA.
9. Is the course cross listed (credit cannot be earned for more than one of two or more courses) with any other course? If yes, list the course(s) and attach course description of affected courses. NA.
10. Is the course repeatable for earned credit? NA.

B. RATIONALE

1. Reason/need for the change

Rationale for the proposed prefix changes is consistent with broader changes in the Design and Engineering Management proposal. All course prefix changes are being provided to help best align existing courses for the new DEM curriculum.

2. Student implications (describe the basis for each estimate): NA.

C. IMPLICATIONS FOR EXISTING PROGRAMS

1. For all proposals:
   a. How will the proposed change affect the demand for other courses in your department and for courses in other programs? NA.
   b. When the content of a proposed course substantially overlaps another discipline, the initiator of the new course should submit letters of endorsement from the chair of the department (s) with an interest in the proposed courses. NA.
   c. Is this course offered at Firelands College? Yes the course changes are being discussed with persons at Firelands.
   5. Will this course change require a corresponding change in program guidelines. NA.
   6. Is this course intended to satisfy one of the University General Education core requirements. NA.
   7. Is this course intended to satisfy a Group Requirement in the College of Arts & Sciences? NA.

D. STAFFING IMPLICATIONS/QUALIFICATIONS

1. Are there enough faculty and staff with expertise available now? NA.
2. How will this change affect the allocation of faculty and staff in the department/school college? NA.
3. How will this change affect faculty work load. NA.

E. AVAILABILITY OF RESOURCES

1. Indicate any unique space requirements for new or modified courses, and any space likely to be released by the elimination or modification of existing courses. NA.
2. Indicate any unique library, computer, or instructional media resources that will be needed for new or modified courses. Are they already available? NA.
3. Indicate any new one-time or continuing costs for materials, equipment, services, or personnel directly associated with a new or modified course. NA.

F. OTHER INFORMATION

1. Provide other information that may be helpful in the review process, as appropriate. NA.
Appendix D:

Flow Chart to be Used in the Advising Process
This flow chart is to be used in the Design and Engineering Management advising process to explain relationships among various components.
Complete 12 hours of coop during sophomore, junior and senior years

Complete 39 hour DEM core across 4 years, articulated total experience

Elect concentration, 15 hours of Quality Systems or Design mainly last 2 years

Complete 9 hours of Business during sophomore, junior and senior years

Complete 24 hours of University courses, primarily in first 2 years

Complete 24 hours of Business during sophomore, junior and senior years

Complete 12 hours of Technical and/or Business Electives by advisement

Complete 24 hours of BG Perspective courses, primarily in first 2 years

ATE and QS students also use the Quality Systems Concentration
Appendix E:

Aggregate Teaching Loads Resulting From Design and Engineering Management Proposal