



Minnesota State University, Mankato HOLD and CLEAR buttons only compatible with Acrobat V. 4 and 5
Curriculum Proposal

0751

Please type or select the requested information. Print completed forms, add appropriate paper attachments, and route through MSU's curricular process for recommendations and decisions.

(Check all that apply):		Proposal #	328
College: Science, Engineering and Technology	<input checked="" type="checkbox"/> Undergraduate	Effective Date of Change:	
Department: Electrical and Computer Engineering and T	<input type="checkbox"/> Graduate	Academic Year	06-07
Program: Electronic and Computer Engineering Techn	CIP #	(For Office Use Only)	
Type of Change: COURSE PROPOSALS		Course Designator and Number	Number of Credits
Proposed: New Course		EET 340	4
Title Current:		(if applicable)	
Title Proposed: Programmable Hardware Technology			
24-Char. Abbrev: Prog. Hardware Tech.			

Include a course or program description for the Bulletin (30-40 words maximum for courses, 100 for programs):
 Create working programmable hardware using FPGA, GAL and other logic technology. Use industry standard tools such as Verilog, Xilinx, Orcad and Multisim along with development kits and extension boards to implement programmable systems. Interface LED displays, switches and I/O devices with programmable logic to create processing systems. Evolution of programmable logic and analog circuits.
 Pre: EET 143

Rationale or Justification for change:

This course develops engineering skills needed in order to effectively use a special class of hardware components. These components are routinely used by engineers in product upgrade and development to provide low-cost, mid-performance-level capabilities that can easily be modified as applications needs change. The proposed course was strongly endorsed by the ECET Industry Advisory Board at the Fall 2005 meeting.

*****For General Education or Cultural Diversity Courses Only*****

General Education Course:		Cultural Diversity Course:
GE Category #	GE Category Name (Maximum of 3 Categories)	(Please check one.)
N/A		<input type="checkbox"/> Core (At least 75% devoted to topics of race, gender, sexual orientation, age, class, and disabilities as they occur in United States Society.)
N/A		<input type="checkbox"/> Related (At least 25% devoted to the above topics or to a global perspective on topics related to African American, Asian, Hispanic, and Native American inhabitants of the United States.)
N/A		

? For Writing Intensive Courses, attach a description of the kind and quantity of writing.
 ? For Upper Division Courses, include a description of the respects in which it is broad and general rather than narrow and specific, and so suitable as GE.

Attach paper copies of the following:

- Syllabus or course outline.
- Course's student learning outcomes associated with each GE competency or CD designation.
- List of strategies to be used to assess students' achievement of each GE competency or CD designation.

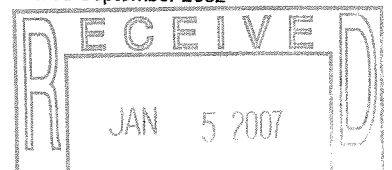
*****For New Courses*****

(Check all that apply):	Instructional Type: Lecture/Lab	Course will be offered:
<input type="checkbox"/> Course is an elective.	Grading Format: <input checked="" type="checkbox"/> Grade <input type="checkbox"/> P/N	<input type="checkbox"/> Fall Semester
<input checked="" type="checkbox"/> Course is required for program	EET	<input checked="" type="checkbox"/> Spring Semester
<input checked="" type="checkbox"/> Pre- or Co-requisites:	Pre: EET 143	<input type="checkbox"/> Summer Session
<input checked="" type="checkbox"/> Other courses are being changed or eliminated. (Explain.)	Please see attached form showing changes in the program.	

Course content or title is similar to courses in other departments. (Attach copy of letter of agreement with other program(s) contacted. Indicate the nature of the discussions and/or resolution of differences or potential conflicts.)

Attach paper copies of the following:

- Syllabus or course outline.
- Course's student learning outcomes.
- A list of resources required to offer and support this course.
- A description of how teaching this course will affect department staffing.
- If 400/500 level course, an explanation of added expectations of graduate students.





Minnesota State University, Mankato
Curriculum Proposal

Signature Page

Department

Recommended (Category/ies _____)
 Not Recommended (Category/ies _____)

Will B. Hudson
Department Chair

10-30-06
Date

Comments:

College Curriculum Committee

Recommended (Category/ies _____)
 Not Recommended (Category/ies _____)

Karen C. Olson
Committee Chair

11/3/06
Date

Comments:

College Dean

Recommended (Category/ies _____)
 Not Recommended (Category/ies _____)

[Signature]
Dean

11/6/06
Date

Comments:

General Education Subcommittee

Recommended (Category/ies _____)
 Not Recommended (Category/ies _____)

General Education Subcommittee Chair

Date

Comments:

Undergraduate Curriculum and Academic Policy Committee

Recommended (Category/ies _____)
 Not Recommended (Category/ies _____)

[Signature]
UCAF Faculty Chair

4/18/07
Date

Comments:

Faculty Association Graduate Committee

Recommended
 Not Recommended

Faculty Association Graduate Chair

Date

Comments:

Graduate Dean

Recommended
 Not Recommended

Graduate Dean

Date

Comments:

Academic Affairs Council

Recommended (Category/ies _____)
 Not Recommended (Category/ies _____)

[Signature]
Assistant Vice President

4/20/07
Date

Comments:

Senior Vice President and Vice President for Academic Affairs

Approved (Category/ies _____)
 Not Approved (Category/ies _____)

[Signature]
Sr. Vice President / Vice Pres. Academic Affairs

4/20/07
Date

Comments:

EET 340 Programmable Logic Technology (4 credits)
Course Proposal
Outline

Class Schedule: 3 lectures, 1 2-hour lab

Description: Create working programmable hardware using FPGA, GAL and other logic technology. Use industry standard tools such as Verilog, Xilinx, Orcad and Multisim along with development kits and extension boards to implement programmable systems. Interface LED displays, switches and I/O devices with programmable logic to create processing systems.

Texts: (in process)

Course Outline:

No. Lectures

Review logic design basics.	3
FPGA introduction.	1
Verilog syntax, functions, keywords, rules.	8
Verilog simulation tools.	6
Development kits.	1
Design, simulate, implement and test FPGA logic systems in development kits.	9
FPGA technology evolution.	2
GAL technology & tools.	4
Design, simulate, implement and test GAL logic designs.	6
Evolution of programmable logic and analog circuits.	2

Laboratory Outline:

Lab No.

Logic circuit operation.	1
FPGA introduction.	2
Verilog design & simulation tools.	3
Delay and Not functions design and simulate.	4
Multiplexer function design and simulate.	5
Latch and Flip Flop design and simulate.	6
Use of Development kits.	7
Counter design, simulate, and implement using development kit.	8
Multiplexer design, simulate, and implement using development kit.	9
Seven-segment display design, simulate and implement using development kit.	10
GAL design & simulations tools.	11
AND/OR/NOT functions GAL logic design, simulate, implement and test.	12
Multiplexer, switches and LED display GAL logic design, simulate, implement and test.	13
Counter GAL logic design, simulate, implement and test.	14

EET 340 Programmable Logic Technology
Course Proposal
Outcomes

After completing Programmable Logic Technology (EET 340) the student will be able to:

1. Use Xilinx FPGA tool to create a project, load source code, and check syntax.
2. Implement small-scale logic designs in FPGA hardware.
3. Create a Test Bench to use in exercising the system design.
4. Use ModelSim to simulate the system design and Test Bench.
5. Create a User Constraints file to interface the design to input/output devices.
6. Use Xilinx FPGA tools to develop a system involving an FPGA and development kit I/O functions.
7. Describe the capabilities of current products and the evolution of FPGA technology.
8. Use GAL tools to create a logic design.
9. Program a GAL chip.
10. Test GAL chip logic designs with switches and LEDs.
11. Simulation GAL logic designs using Orcad and/or Multisim.

EET 340 Programmable Logic Technology
Course Proposal
Resource Needs

Resources to support this course will result from allocation of existing department resources.

EET 340 Programmable Logic Technology
Course Proposal
Staff Impact & Needs

Staff Impact – Staffing resources to support this course will result from allocation of existing department resources.