PROCESS A NON-GENERAL EDUCATION – **CURRICULUM PROPOSAL** SCC # 04-05-114

PROPOSAL TITLE: Automotive Engineering

Sponsor(s): Krishan Kumar Bhatia E-Mail: bhatia@rowan.edu Ext: 5346

E-Mail: Ext.

E-Mail: Ext.

DEPARTMENT: Mechanical Engineering

COLLEGE: Engineering

If Liberal Arts & Sciences CHECK : ___ **History/Humanities** ___**Math/Sciences** ___**Social/Behavioral Sciences**

_____ **UNDERGRADUATE** __X__ **GRADUATE**

THE ATTACHED ***NON-GEN-ED*** PROPOSAL IS BEST DESCRIBED BY THE ITEM(s) CHECKED.

__x__ New non-gen-ed course

_____ Short-term non-gen-ed course

__ __ Minor curricular changes (fewer than three)

_____ Existing non-gen-ed course

_____ Non-gen-ed degree requirements

_____ Major

_____ Minor, specialization, concentration, track, certificate program

The following signatures REPRESENT APPROVAL

Department Chair: Date: Feb 7 2005

Department Curriculum Chair: Date:

Academic Dean: Date: 2-10-05

College Crit Date: 4/1/05 College Signature:

UNIVERSITY CURRICULUM COMMITTEE

Senate Curriculum Chair Signature: Date: Senate Announcement/Vote:

Comments:

EXECUTIVE VICE PRESIDENT/PROVOST Signature: Date: 5/25/05

✓ Approved ~ Not Approved due to the following: ____ Student Cr Hrs ____ Faculty Load Hrs ____ Equalized Cr Hrs

REGISTRAR

Date: 5/31/05 Course Description Received & Approved ~ Hegis Taxonomy & Course 0910-544

Registrar Signature:

NOTIFICATION FORWARD

✓ SCC Chair ✓ Academic Dean ✓ Department Chair ✓ Registrar ✓ Sponsor(s)

Trans. 8/15/05

SCC#__-__-___

NEW COURSE PROPOSAL

Details

a. Course Title:

Automotive Engineering

b. Sponsor

Dr. Krishan Kumar Bhatia, Mechanical Engineering

c. Credit Hours – 3

d. Course Level: Graduate

e. **Prerequisites:** Dynamics (0901.291), Machine Design (0910.241), Mechanical Design and Synthesis (0910.341), Engineering Thermodynamics II (0910.312), Fluid Mechanics II (0901.313), Transfer Process I: Heat (0906.311) or with instructor permission.

f. **Suggested Time and Scale of Implementation:** To be offered every year starting Spring 2006.

Curricular Effect

The proposed course will be offered as a graduate-level elective for Mechanical Engineering students. Graduate mechanical engineering students are required to take four mechanical engineering electives in their first year. This course will serve as one of these electives. Other engineering students with the required prerequisites may also enroll in this course.

The proposed course will require no additional staff, space or other resources. The only library resources required for this course will be access to the electronic journals already maintained by the Library.

Rationale

The automobile is one of the most interesting platforms for engineering study. In this everyday machine, principles from dynamics, thermodynamics, fluid mechanics, heat transfer, controls, and electronics are combined to meet a simple human transportation need. However, in order for success, modern automobiles must meet increasingly stringent demands from customers as well as governmental regulatory agencies. These include: an aesthetically appealing interior and exterior, an emotionally captivating driving experience, long term reliability and quality, durability in all climactic conditions, and crash safety. This remarkable machine must do this while still maintaining a relatively affordable price. Furthermore, increasing environmental awareness is now forcing manufactures to not only question how vehicles are designed for pollution control, but how they are built, how they are used, and how they are disposed of at the end of their product cycle. The proposed course would address how engineering principles are used in vehicle design. Students will be given the opportunity to learn the scientific and engineering principles behind modern vehicle design, and apply these principles to automotive engineering challenges.

Essence of the Course

a. Objectives

The goal of this course is to present (1) the scientific principle involved in the automobile, (2) the challenges of modern automotive engineering, and (3) the methods for solving current and future vehicle design problems. Topics will include vehicle use, automobile dynamics, handling, power plant, power transmission, and advanced energy storage. Modern vehicle research and development, as well as emerging technologies, will also be discussed.

b. Topical Outline/Content

Week	Topic	Projects/Exams
1	Introduction: Automobile Use, Design, and Aesthetics	Vehicle Build Competition
2	Vehicle Road Loads	
3	Vehicle Dynamics	
4	Chassis/Suspension	Component Design Project
5	Handling and Steering	
6	Braking Systems	
7	Internal Combustion Engines: Thermodynamic Fundamentals	
8	Internal Combustion Engines: Ignition, Cooling, and Engine Control	Mid-Term Exam
9	Internal Combustion Engines: Forced Induction and Emissions	Concept Vehicle Design Project
10	Vehicle Transmission Design	
11	Vehicle Traction, 4WD, and All Wheel Drive	
12	Drivetrain Integration	
13	Batteries, Electric Motors, and Hybrid Electric Vehicles	
14	Hydrogen, Fuel Cells, and Fuel Cell Vehicles	
Finals		Final Exam

c. Evaluation of students and grading procedure

Students will be evaluated through in-class examinations, completion of homework problem sets, and hands-on design projects. Students will also be required to write reviews of recently applied automotive technology and to study technical publications.

d. Course evaluation

The success of the course in meeting course goals will be determined through use of in-class examinations, the outcome of projects, and student evaluations.

Letters of Consultation

Automotive Engineering is a sub-field within Mechanical Engineering. Furthermore, the proposed introductory course involves topics of primarily a Mechanical Engineering nature. For this reason, the only attached letter of consultation is one of support from Library Resources.

SCC#__-__-___

COURSE DESCRIPTION: AUTOMOTIVE ENGINEERING, 0910-544

This course deals with the engineering of automobiles at the graduate level. The course draws upon knowledge from the fields of dynamics, thermodynamics, fluid mechanics, heat transfer, and machine design. Topics covered include vehicle dynamics, internal combustion engines, power transmission, and advanced technology vehicles. The course includes appropriate exams, automobile related design projects, and review of recent technologies and technical publications within the field.

Prerequisites: Dynamics (0901.291), Machine Design (0910.241), Mechanical Design and Synthesis (0910.341), Engineering Thermodynamics II (0910.312), Fluid Mechanics II (0901.313), Transfer Process I: Heat (0906.311) or with instructor permission.

Rowan University

Campbell Library

Library Resources Form

Department/School: College of Engineering/ Mechanical Engineering

Proposed by: Dr. Krishan Bhatia

Program Title: Automotive Engineering (Graduate)

Anticipated Date for Course/Program Offering: Spring 2006

Resources that should be acquired

No additional resources are needed at this time.

Resources available in Campbell Library

The library has basic holdings in the Library of Congress area of Mechanical Engineering. An engineering approval plan is utilized to provide current materials in the engineering disciplines.

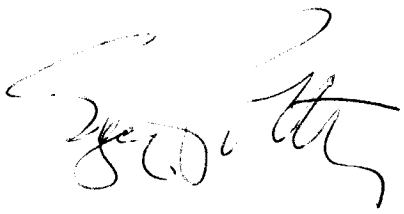
List key periodical resources

Campbell Library is fortunate to have access to online journal databases in a large number of academic subjects, including civil and environmental engineering, transportation, mathematics, and the physical sciences.

Of particular significance is the ASME database (American Society of Mechanical Engineers), which contains relevant full-text articles. In addition, both Engineering Village and Elsevier Science Direct provide journal articles, many full-text, on science and engineering. Also, MathSci + provides comprehensive coverage of international research in mathematics and mathematically related research in statistics, computer science, physics, operations research, engineering, biology, and related disciplines. Almost 2,000 journals are represented.

Librarian remarks

Given the library's current book holdings and online journal access, this course can be supported.



Gregory C. Potter
Library Liaison

2/10/2005

SCC# - - ___

Rowan University

LIBRARY RESOURCES

to

SUPPORT A NEW COURSE* or *NEW PROGRAM PROPOSAL

The purpose of this form is to provide a channel of communication between the library and faculty designing new courses/programs. The information will be used to assess the resources available in the library, and to identify resources the library should acquire to support the course/program. The information will also provide rationale for institutional support for library acquisitions.
This form should be completed in a coordinated effort between the course sponsor(s) and the academic department liaison librarian.

- The sponsor(s) complete parts A & D
  If assistance is required to complete parts A & D, please notify the liaison librarian.

- Forward this form to the librarian who will complete parts B, C, & E

  This form must be completed and attached to the original curriculum proposal before being approved by the Senate Curriculum Committee

A. College Engineering Department Mechanical Engineering

Proposed by: Krishan Kumar Bhatia Date: Jan. 31, 2005

Course Title: Automotive Engineering

Anticipated Date for Course/Program Offering: Spring 2006

B. Describe the resources available in the library to support this course/program, including reference, monographic, electronic databases, audio-visual materials, etc. A summary statement is sufficient.

C. List key periodicals available in the library to support this course/program.

D. List specific resources that should be acquired to support this course.

None

E. Librarian comments and recommendations:

SCC#__-__-___

NEW COURSE PROPOSAL

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b. Sponsor

Dr. Krishan Kumar Bhatia, Mechanical Engineering

c. Credit Hours – 3

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Rationale

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b. Topical Outline/Content

Week	Topic	Projects/Exams
1	Introduction: Automobile Use, Design, and Aesthetics	Vehicle Build Competition
2	Vehicle Road Loads	
3	Vehicle Dynamics	
4	Chassis/Suspension	Component Design Project
5	Handling and Steering	
6	Braking Systems	
7	Internal Combustion Engines: Thermodynamic Fundamentals	
8	Internal Combustion Engines: Ignition, Cooling, and Engine Control	Mid-Term Exam
9	Internal Combustion Engines: Forced Induction and Emissions	Concept Vehicle Design Project
10	Vehicle Transmission Design	
11	Vehicle Traction, 4WD, and All Wheel Drive	
12	Drivetrain Integration	
13	Batteries, Electric Motors, and Hybrid Electric Vehicles	
14	Hydrogen, Fuel Cells, and Fuel Cell Vehicles	
Finals		Final Exam

c. Evaluation of students and grading procedure

Students will be evaluated through in-class examinations, completion of homework problem sets, and hands-on design projects. Students will also be required to write reviews of recently applied automotive technology and to study technical publications. Knowledge of these advanced technologies will enable students to conduct projects and give presentations related to the design of alternative power train vehicles.

d. Course evaluation

The success of the course in meeting course goals will be determined through use of in-class examinations, the outcome of projects, and student evaluations.

Letters of Consultation

Automotive Engineering is a sub-field within Mechanical Engineering. Furthermore, the proposed introductory course involves topics of primarily a Mechanical Engineering nature. For this reason, the only attached letter of consultation is one of support from Library Resources.

Mosto, Patricia

From: Bhatia, Krishan K
Sent: Friday, May 20, 2005 12:48 PM
To: Mosto, Patricia
Cc: Faison, Christy; Milou, Eric; Mosto, Patricia
Subject: RE: curriculum proposals

Hello Pat,

Attached are updated versions of the undergrad and grad course proposals (please note the differences in the "Objectives" and "Evaluation of Students" sections). Essentially, for the graduate students in the course, I will emphasis emerging topics in advanced power train design (specifically, hybrid electric and fuel cell vehicles). Graduate students will then be required to review technical papers related to these topics, document their findings, and present them to the class of both undergrad and grad students. In addition, graduate students will be required to conduct an addition project on vehicle design (above and beyond the projects already required for the undergrad version) specifically related to the implementation of hybrid and/or fuel cell power trains in vehicles for improving fuel economy and reducing greenhouse gas emissions. In a nutshell, both groups of students will learn the fundamentals of automotive engineering and receive and introduction to advanced vehicle technologies near the end of the course, but only the grad students will be required to develop an in-depth understanding of the advanced topics and asked to apply them to design.

Please let me know if you need anything else. Thanks for the feedback!
Krishan

Dr. Krishan Kumar Bhatia
Assistant Professor
Mechanical Engineering
Rowan University
201 Mullica Hill Road
Glassboro, NJ 08028-1701
ph: 856-256-5346
bhatia@rowan.edu

From: Mosto, Patricia
Sent: Tue 5/17/2005 10:52 AM
To: Bhatia, Krishan K
Cc: Faison, Christy; Milou, Eric; Mosto, Patricia
Subject: curriculum proposals

Hi Krishan,

I'm in the process of reviewing your proposals SCC 04-05-402 and SCC 04-05-404 "Automotive Engineering" both undergraduate and graduate.

There is no clear mandate of what graduate students would do on the graduate version of the course (except one line in the evaluation procedure) to make this a stand alone course in regards to the undergraduate one. Please, be more specific what constitutes this as a graduate course (500 level) and differ from the undergraduate course (400 level).

Please clarify and resubmit.