

## ME 503 – CONVECTIVE HEAT TRANSFER – FALL 2013

### CATALOG

DESCRIPTION: Laminar and turbulent forced convection heat transfer over surfaces and inside tubes, including non-circular cross sections; Developing flows; Laminar free convection. Emphasis throughout is on the analytical approach.

INSTRUCTOR: Dr. Emmanuel C. Nsofor  
Office: E 20 Engineering Building  
Phone: 453-7021  
E-mail: nsofor@engr.siu.edu  
Office Hours: TR 11.00 a.m. to 12.00 noon and 3.30 p.m. to 5.30 p.m. (or by appointment).

TEXTBOOK: Convective Heat and Mass Transfer, by William Kays, Michael Crawford and Bernhard Weigand, 4<sup>th</sup> Edition, McGraw-Hill Higher Education Publishing Company, 2005. ISBN 0-07-246876-9. Information on the price can be obtained online through SIUC webpage – Bookstore or by phone # 536-3321.

You may need to review your undergraduate heat transfer by using a more elementary textbook such as Fundamentals of Heat and Mass Transfer by F. P. Incropera and D. P. DeWitt, 6<sup>th</sup> Edition, John Wiley & Sons Publishers, New York, 2007 and Heat and Mass Transfer: Fundamentals & Applications by Y. A. Cengel and A. J. Ghajar, 4<sup>th</sup> edition, McGraw Hill Publishing Company, 2011.

SOFTWARE: You should be familiar with your choice of software or other numerical tools for solving equations or problems. You will also be linked to TEXSTAN, a boundary-layer code for solving two-dimensional convective heat transfer problems. More information on this code is in Appendix F (Page 496) of the textbook.

PREREQUISITE: ME 302, Graduate Standing or consent of the instructor.

### COURSE WEB

ADDRESS: From <https://online.siu.edu/>

### ADMINISTRATION

OF THE COURSE: Students are expected to attend all classes. Attendance will be registered. All homework must be turned in at the beginning of class on due dates. The guidelines given for the presentation of the problems should be followed strictly.

For the homework assignments, you are encouraged to consult other students or the instructor if you have problems. **Consulting is allowed but not copying.**

The overall course grade will be based on the following:

Homework Problems	20%
Mid Semester Test	25%
Comprehensive Problems	30%
Final Examination	25%

There will be a 5% bonus for class attendance and participation. Any student who is absent from a class for ANY reason shall lose one attendance point. The same will be the case if the professor decides that a student is late enough not to benefit adequately from a class. The maximum loss for this bonus *attendance points* is of course 5%. Note that loss of all the bonus points does not affect your maximum score of 100%.

<u>GRADES:</u>	A	90 – 100%
	B	80 – Less than 90%
	C	70 – Less than 80%
	D	60 – Less than 70%
	F	Less than 60%

### OUTLINE OF TOPICS

1. Introduction and Review of Basic Concepts
2. Differential Equations for the Laminar Boundary Layer
3. Integral Equations for the Boundary Layer
4. Momentum Transfer in Laminar Internal Flows
5. Heat Transfer in Laminar Internal Flows
6. Momentum Transfer in Laminar External Boundary Layers
7. Heat Transfer in Laminar External Boundary Layers
8. Differential Equations for the Turbulent Boundary Layer
9. Momentum Transfer in Turbulent External Boundary Layers
10. Convective Heat Transfer in Turbulent External Boundary Layers
11. Convective Heat Transfer in Turbulent Internal Flows
12. Convective Heat Transfer with Body Forces

### SCHEDULE/DUE DATES

Mid Semester Test	Thursday, October 10 at 9.35 a.m.
Homework Problems	Due dates will be given when these are assigned.
*Final Examination	Monday, December 9 at 8.00 p.m.

\*Will be confirmed on the last day of class as it is subject to change.

Note: The professor reserves the right to make changes as necessary at any time.

## SYLLABUS ATTACHMENT – FALL 2013

### **IMPORTANT DATES**

Last day to add a class (without instructor permission) ..... **8/30/2013**

Last day to withdraw completely and receive a 100% refund.....**9/01/2013**

Last day to drop a course using Salukinet **10/27/2013**

Last day to file diploma application (for name to appear in Fall Commencement program) **11/01/2013**

Final examinations .....**12/9 – 12/13/2013**

*Note: For outreach, internet, and short course drop/add dates, visit Registrar's Academic webpage <http://registrar.siu.edu/>*

### **FALL SEMESTER HOLIDAYS**

Labor Day 09/02/2013

Fall Break 10/12—10/15/2013

Thanksgiving Break 11/27—12/1/2013

### **WITHDRAWAL POLICY ~ Undergraduate only**

Students who officially register for a session may not withdraw merely by the stopping of attendance. An official withdrawal form needs to be initiated by the student and processed by the University. For the proper procedures to follow when dropping courses and when dropping from the University, please visit

<http://registrar.siu.edu/pdf/ugradcatalog1314.pdf>

### **INCOMPLETE POLICY~ Undergraduate only**

An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within one semester following the term in which the course was taken, or *graduation*, whichever occurs first. Should the student fail to complete the course within the time period designated, that is, by no later than the end of the semester following the term in which the course was taken, or graduation, whichever occurs first, the incomplete will be converted to a grade of *F* and the grade will be computed in the student's grade point average. *For More information please visit*

<http://registrar.siu.edu/grades/incomplete.html>

### **REPEAT POLICY**

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit no more than two times (two total enrollments) unless other-wise noted in the course description. For students receiving a letter grade of A, B, C, D, or F, the course repetition must occur at Southern Illinois University Carbondale. Only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. *See full policy at*

<http://registrar.siu.edu/pdf/ugradcatalog1314.pdf>

### **GRADUATE POLICIES**

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please visit

<http://gradschool.siu.edu/about-us/grad-catalog/index.html>

### **DISABILITY POLICY**

Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must come to the disability office to open cases. The process involves interviews, reviews of student-supplied documentation, and completing Disability Accommodation Agreements.

<http://www.siu.edu/dss>

### **STUDENT CONDUCT CODE**

[http://policies.siu.edu/other\\_policies/chapter3/conduct.html](http://policies.siu.edu/other_policies/chapter3/conduct.html)

### **SALUKI CARES**

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For Information on Saluki Cares: (618) 453-5714, or [siucares@siu.edu](mailto:siucares@siu.edu),

<http://salukicare.siu.edu/index.html>

## **EMERGENCY PROCEDURES**

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. We ask that you become familiar with the **SIU Emergency Response Plan** and **Building Emergency Response Team (BERT)** program. Emergency response information is available on posters in buildings on campus, available on BERT's website at [www.bert.siu.edu](http://www.bert.siu.edu), Department of Safety's website [www.dps.siu.edu](http://www.dps.siu.edu) (disaster drop down) and in Emergency Response Guideline pamphlet. Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. *It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.*

## **INCLUSIVE EXCELLENCE**

SIU contains people from all walks of life, from many different cultures and sub-cultures, and representing all strata of society, nationalities, ethnicities, lifestyles, and affiliations. Learning from and working with people who differ is an important part of education, as well an essential preparation for any career.

## **MORRIS LIBRARY HOURS**

<http://www.lib.siu.edu/about>

## **LEARNING AND SUPPORT SERVICES**

Help is within reach. Learning support services offers free tutoring on campus and math labs. To

find more information please visit Center for Learning and Support Services website for:

**Tutoring:** <http://tutoring.siu.edu/>

**Math Labs**

[http://tutoring.siu.edu/math\\_tutoring/index.html](http://tutoring.siu.edu/math_tutoring/index.html)

## **WRITING CENTER**

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit

<http://write.siu.edu/>

## **AFFIRMATIVE ACTION & EQUAL OPPORTUNITY**

Our office's main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. *For more information visit* <http://diversity.siu.edu/#>

*Additional Resources Available:*

**SALUKINET:**

<https://salukinet.siu.edu/cp/home/displaylogin>

**ADVISEMENT:** <http://advisement.siu.edu/>

**PROVOST & VICE CHANCELLOR:**

<http://pvcaa.siu.edu/>

*"We emphasize student achievement and success because achievement and success are essential if we are to shape future leaders and transform lives"*