FACULTY COMMITTEE ON GRADUATE EDUCATION, CONTINUING 
EDUCATION AND SPECIAL PROGRAMS

GRADUATE PERMISSION TO CROSS-LIST FORM

This form must ALWAYS be accompanied by a graduate COURSE FORM.

Contact Name: Martin Jones Email: jonesm@cofc.edu Phone: 953-5735

Department and School Name: Mathematics, School of Science and Mathematics
Name and Acronym of Graduate Program: Master of Science in Mathematics MATH

Date (Semester/Year) cross-listing will take effect: Fall 2015

I. CATEGORY OF REVIEW (Check all that apply)

X New Course -- Course Number/Title Math 660 Stochastic Processes
☐ Existing Course -- Course Number/Title
☐ Special Topic Course -- Course Number/Title

This course will be cross-listed with an

X undergraduate course (complete sections II, III, and IV below) Math 460 Stochastic Processes
☐ existing graduate course (complete section IV below)

II. CURRICULUM DIFFERENCES – UNDERGRADUATE AND GRADUATE LEVELS

Please submit separate syllabi for both graduate and undergraduate courses

Syllabi for both undergraduate and graduate courses are attached X YES ☐ NO

Explain the differences between the syllabi in terms of requirements, learning objectives and course content

Graduate students will be expected to show mastery of the more theoretical aspects of the course. This will involve extra homework exercises, additional problems on exams, and a project, culminating in a report synthesizing material learned from the course. The project will involve reading and understanding primary literature in the field.

September 2011
III. APPROVAL SECTION – GRADUATE COURSE WITH UNDERGRADUATE COURSE

Undergraduate Course Number / Title Math 461 Time Series

Names and Signatures:

Name of Department Chair of the Graduate Course: Dr. Robert Mignone

Signature __________________________________________________________________________ Date: 11/19/2014

Department Chair of the Undergraduate Course: Dr. Robert Mignone

Signature __________________________________________________________________________ Date: 11/19/2014

Graduate Program Director: Dr. Martin Jones

Signature __________________________________________________________________________ Date: ______________

Provost

Signature __________________________________________________________________________ Date: ______________

IV. APPROVAL SECTION – GRADUATE COURSE WITH EXISTING GRADUATE COURSE

Graduate Course Number / Title of Existing Graduate Course: Math 661 Time Series

Program(s) of Existing Graduate Course: Master of Science in Mathematics

Names and Signatures:

“Host” Program Director:

Signature __________________________________________________________________________ Date: ______________

“Requesting” Program Director:

Signature __________________________________________________________________________ Date: ______________

Provost

Signature __________________________________________________________________________ Date: ______________

Return form to the Graduate School Office for Further Processing
Signature of Chair of the Faculty Committee on Graduate Education, Continuing Education & Special Programs:

[Signature] Date: 7/27/2015

Signature of Chair of the Graduate Council:

[Signature] Date:

Signature of Faculty Senate Secretary:

[Signature] Date:

Date Approved by Faculty Senate:
Math 460 Stochastic Processes
College of Charleston
Department of Mathematics
Fall 2012 Syllabus

Instructor Information
Dr. Martin Jones
Office Hours: T.B.A.
Office: RSS 345
E-mail: jonesm@cofc.edu

Course Meetings
Mondays and Wednesdays in Maybank 224 from 7:00 - 8:15 PM.

Prerequisites
Math 430 Mathematical Statistics I or permission of the instructor.

Textbook
Stochastic Processes by Sidney I. Resnick. In this course, we will cover selections from Chapters 1–6.

Course Description
Topics will include probabilistic tools, Markov chains, renewal theory, point processes, continuous time Markov chains, and Brownian motion.

Student Learning Outcomes:
1. Recognize and apply different stochastic models.
2. Understand the theory behind the construction of stochastic processes.
3. Understand the proofs behind the theory of stochastic models.
4. Use stochastic processes in real applications to model random phenomena.

These outcomes will be assessed in homework and on in class exams.

Graded Assignments
In this course, we will have one midterm exam, a final examination, and bi-weekly homework.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Midterm</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Homework</td>
<td>60%</td>
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Important Dates
Midterm: Wednesday, October 08
Final Exam: Wednesday, December 06

Course Grades
Midterm and Final Exams (20% each): These two in class exams will assess your understanding of the mathematical theory in the development of stochastic processes. You will be expected to reproduce short proofs, show facility with the probabilistic tools, and perform calculations and predictions using the stochastic models.

Homework (60%): Every other week you will be expected to turn in assigned problems from the text. These problems may be a combination of the theory of stochastic processes and their applications. Some will require the statistical software package R to
aid in the calculations and simulations of stochastic processes.

**Grading Scale**: Grades will be based on the percentage of points earned in the categories listed above. A (93-100%), A- (90-92%), B+ (87-89%), B (84-86%), B- (80-83%), C+ (77-79%), C (74-76%), C- (70-73%), D+ (67-69%), D (64-66%), D- (60-63%), F (below 60%).

**Attendance Policy**: You are expected to attend class every day. If you miss class, you will need to obtain notes from one of your classmates and talk with me about material that you do not understand. If for some reason you are not able to attend class the day that an assignment is due, you should email me your assignment that day. Late assignments will not be awarded full credit. Late assignments will not be accepted after graded papers are returned or problem solutions have been distributed. Make-up exams are only possible with proper documentation from the Absence Memo Office.

**Disability Policy**: If you have a documented disability that will affect your performance in this class, you should contact Disability Services (953-1431) and speak with me in private. No special testing accommodations can be made without a letter from Disability Services. It is the student’s responsibility to provide me with the accommodation envelope at least one week before any scheduled exam. Without exception, an examination must be taken at our scheduled class meeting time.

**Supplementary Material**: Supplementary materials for our course will be posted on OAKS.

**E-Mail**: The best way to contact me is by e-mail. Please always include your name, the course name, and the section number in your e-mails. In general, you should expect a response within two school days.

**Coverage of Topics**

**Weeks 1 and 2**: Generating Functions, Simple Branching Processes, Limit Distributions, Stopping Times, Wald’s Identity.

**Weeks 3 and 4**: Markov chain construction, higher order transition probabilities, transience and recurrence, periodicity, canonical decomposition of Markov chains, absorption probabilities, invariant measures, stationary distributions.

**Weeks 5 through 7**: Introduction to renewal processes, renewal reward processes, renewal limit theorems, Blackwell and key renewal theorems, regenerative processes, queueing examples.

**Weeks 8 and 9**: Introduction to point processes, Poisson processes, transforming Poisson processes, the order statistic property, thinning of Poisson processes, records.

**Weeks 10 through 12**: Continuous time Markov chains, the backward equations and the generator matrix, Laplace transform methods, queueing networks, reversibility and uniformizability.

**Weeks 13 through 15**: Brownian motion construction, the reflection principle, strong Markov property, distribution of the maximum of Brownian motion, Brownian motion with a drift, the Brownian bridge and the Kolmogorov-Smirnov statistic, Khintchine’s law of the iterated logarithm for Brownian Motion.