Stochastic Manufacturing & Service Systems
H. Milton Stewart School of Industrial and Systems Engineering
Georgia Institute of Technology
October 16, 2014

Course Instructor:
Xinchang Wang
Class Room: IC 117
Meeting Time: 09:05am – 09:55am on MWF

Course Description:
Manufacturing and service systems typically have random components affecting their behavior such as the demand for products and services. Much of the focus will be given on understanding and applying quantitative methods that are useful in analyzing, designing, and operating stochastic systems. We will additionally present applications of these methods for understanding, managing and reducing variability for inventory, production and service systems.

Topics Covered:
- The Newsvendor model: profit maximization and cost minimization
- Performance measures of a queueing system
- Discrete-time Markov Chain (DTMC)
- Poisson Process
- Continuous-time Markov Chain (CTMC)

Prerequisites:
I assume every student enrolled in this course is proficient in ISyE 2027 or equivalent and familiar with the basic principles of Linear Algebra (e.g., Matrix, Linear Systems of Equations) and Calculus (e.g., Integral, Differentiation). Knowing a programming tool such as Excel or Matlab is a plus.

Textbooks:
- Mandatory Littlefield Technology Access Case: Littlefield Technology Access Case, Responsive L, 2014. You should buy a course packet from the bookstore to allow you to play the Littlefield Technologies games. This packet contains your individual Littlefield access code. Do not discard the access code after your first game because you will need it again for the 2nd Technologies will be communicated later.
References:

The Staff and Office Hours:

Xinchang Wang (xwang336@gatech.edu)
- Venue: ISyE Studio/340, ISyE Main Building
- Times: Monday @ 10:00am - 11:00am; Thursday @ 4:00pm-5:00pm

Topic TA: Yilun Chen (ychen757@gatech.edu)
- Venue: Room 408, ISyE Main Building
- Times: Monday and Wednesday @ 2:30pm – 5:00pm; Tuesday and Thursday @ 12:30pm – 2:00pm; Friday @ 2:30pm – 4:30pm

Grader: Jeff Allen (jsallen341@gatech.edu)
- Venue: ISyE Studio on the first floor of ISyE Main building
- Times: Monday, Wednesday @ 2:00pm-3:00pm

Communication:
- T-Square is the main channel for communication. Course material, announcements, homework assignments, practice exams, solutions, and grades will be posted on T-Square. You are responsible to check T-Square regularly. See [https://t-square.gatech.edu](https://t-square.gatech.edu).
- Course material/homework/quizzes/the final/grading related questions must be posted in the e-forum on T-Square. Myself, the topic TA and grader will answer the questions as long as we see them. You can also reply to others’s posts if you have good answers.
- You are welcome to drop me emails to discuss your personal concerns and questions. Please start with [ISyE 3232 B] when drafting your Email Subjects to get timely response.
- Any announcement posted on T-Square will be considered received by the students 24 hours after posting.
- Please respect the office hours of the topic TA and grader.

Grading Policy:
- Long Quiz 1: 15%, in class on Friday, 9/12, 2014
- Long Quiz 2: 15%, in class on Friday, 10/17, 2014
- Long Quiz 3: 15%, in class on Monday, 11/17, 2014
- Final exam: 35%, 8:00am - 10:50am on Wednesday, 12/10, 2014
- *Goal* and Littlefield: 10%
- 8 short quizzes: 10% (1.25% each), will be given in class on a random date and each will take 10-20 min.
Homework:

- Homework will be assigned but not be collected/graded.
- Homework has suggested due dates. It is beneficial to finish homework before the due dates to be well prepared for quizzes and the final exam.

Long Quizzes and Final Exam:

- Three long quizzes will be given and the dates have been scheduled.
- **No makeup long quizzes/exam will be given.** If you cannot take a long quiz on the designated date for any reason, you should bring me official documents at least one week before or contact the office of Dean of Students immediately. Only after I receive official documents or the confirmation from the Dean of Students, a missed long quiz will be replaced by your final exam score. **Keep in mind that the final is usually harder than quizzes.** If you take a long quiz and receive a score, the score cannot be replaced.
- The final will be given on the date scheduled by the university and it will not be optional. Conflicts with the final exam and official excuses will be handled according to university policy as given at the following address [http://www.catalog.gatech.edu/rules/12d.php](http://www.catalog.gatech.edu/rules/12d.php).
- Long quizzes/exam are closed book and closed notes, but I will allow you to bring one A4 page of cheat sheet for long quizzes and the final. No calculators, phones, computers, ipads, or any other relevant course material are allowed. If such items are brought, they should be put in your bag and left at the front or side of the classroom. No restroom during long quizzes. If you have medical situations, please contact me ahead of time. At most one person will be allowed to use the restroom during the final exam.
- Any queries on the grade of a long quiz/exam must be submitted in writing on a separate paper to the instructor, together with the exam/quiz in question. Do not erase/add/modify anything on the exam/quiz if you disagree with the grading and decide to submit an argument. If you submit a re-grading request, the entire exam/quiz will be re-graded; **it is possible that you may lose additional points.**
- Grading arguments must be submitted within 7 days from the day when the graded quiz/exam papers are distributed.

Goal Assignment:

- An one-page report must be submitted by every student in hard copy to summarize: what challenges were faced and how they cope with the challenge. Discuss the principles/policy/strategy that you should have to manage a factory effectively.
- I suggest you reading the “Goal” immediately.
- The goal assignment must be submitted by the start of the class on Wednesday, 9/17, 2014.

LittleField Simulation:

- I will assign students to teams for the Littlefield group assignments. There will be different teams for each Littlefield game. Two games will be counted toward your grade. You will submit a report to answer questions about your experience. Your team for this assignment will submit a single report, and you may not collaborate with any other teams. Note that we
change parameters and distributions of each game for each semester; using the best policy for previous games may be the worst policy for your game.

- To help hold team members accountable, at the end of each game, the teams will fill out a group evaluation. Group evaluation is important and impacts your individual grade for the game.

- More information about Littlefield Technologies will be posted on T-Square.

- Game 1
  (1) Registration due on 9/19 @ noon
  (2) Game starts 9/19 @ 4:03pm
  (3) Game ends 9/26 @ 4:03pm
  (4) Report for Game 1 and Group Evaluation due: on 10/06

- Game 2
  (1) Registration due on 10/31 @ noon
  (2) Game starts 10/31 @ 4:03pm
  (3) Game ends 11/14 @ 4:03pm
  (4) Report for Game 2 and Group Evaluation due: on 11/24

- The reports and group evaluations must be submitted by the start of the class on the due date.

Short quizzes

- Short quizzes will be given in random, closed book and closed notes. No calculators, computers and any other electronic devices are allowed. Each short quiz takes about 10-20 min and you will not be allowed to use restroom during short quizzes. If you have medical situations, please contact me ahead of time.

- No makeup short quizzes will be given under any circumstance. If you miss 1-3 short quizzes, the final exam will automatically take over the grading portions of the missed short quizzes. If you miss more than 3 short quizzes, you will get 0 for the missed short quizzes.

- Any queries on the grade of a short quiz must be submitted in writing on a separate paper to the instructor, together with the quiz in question. Do not erase/add/modify anything on the quiz if you disagree with the grading and decide to submit an argument. If you submit a re-grading request, the entire quiz will be re-graded; it is possible that you may lose additional points.

- Grading arguments must be submitted within 7 days from the day when the graded quizzes are distributed.

GaTech Honor Code

- The Georgia Tech honor code may be found at http://www.honor.gatech.edu/. Any violations of the honor code and/or student/faculty expectations agreement will be taken very seriously.

- Using solutions from previous semesters in any form is considered a violation of Georgia Tech student honor code.
Learning Disabilities
It is the right of any student with a certified learning disability to request necessary accommoda-
tion. Such requests must be made well in advance of the time that the accommodation is required
and a letter of documentation from the ADAPTS office must be presented at the time of any
request.

Important Dates

8/18, 2014 : First day of class
8/22, 2014 : Last day to register/make schedule changes
9/1, 2014 : School holiday
10/10, 2014 : Drop course with a “W” deadline
10/11-10/14, 2014: Fall recess
12/5, 2014 : Last day of class
12/10, 2014 : Final exam

Table 1: Tentative Schedule

<table>
<thead>
<tr>
<th>Week #</th>
<th>Dates</th>
<th>Topics</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/18, 8/20, 8/22</td>
<td>Math review, Newsvendor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8/25, 8/27, 8/29</td>
<td>Newsvendor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9/3, 9/5</td>
<td>Newsvendor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9/8, 9/10, 9/12</td>
<td>Queueing System</td>
<td>Long Quiz 1 on 9/12</td>
</tr>
<tr>
<td>5</td>
<td>9/15, 9/17, 9/19</td>
<td>Queueing System</td>
<td>Goal on 9/17, LF 1 starts on 9/19</td>
</tr>
<tr>
<td>6</td>
<td>9/22, 9/24, 9/26</td>
<td>DTMC</td>
<td>LF 1 ends on 9/26</td>
</tr>
<tr>
<td>7</td>
<td>9/29, 10/1, 10/3</td>
<td>DTMC</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10/6, 10/8, 10/10</td>
<td>DTMC</td>
<td>LF 1 report&amp;evaluation on 10/6</td>
</tr>
<tr>
<td>9</td>
<td>10/15, 10/17</td>
<td>DTMC</td>
<td>Long Quiz 2 on 10/17</td>
</tr>
<tr>
<td>10</td>
<td>10/20, 10/22, 10/24</td>
<td>Poisson Process</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>10/27, 10/29, 10/31</td>
<td>Poisson Process</td>
<td>LF 2 starts on 10/31</td>
</tr>
<tr>
<td>12</td>
<td>11/3, 11/5, 11/7</td>
<td>CTMC</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>11/10, 11/12, 11/14</td>
<td>CTMC</td>
<td>LF 2 ends on 11/14</td>
</tr>
<tr>
<td>14</td>
<td>11/17, 11/19, 11/21</td>
<td>CTMC</td>
<td>Long Quiz 3 on 11/17</td>
</tr>
<tr>
<td>15</td>
<td>11/24, 11/26</td>
<td>CTMC</td>
<td>LF 2 report&amp;Evaluation on 11/24</td>
</tr>
<tr>
<td>16</td>
<td>12/1, 12/3, 12/5</td>
<td>Network of Queues, Recitation</td>
<td>Final Exam</td>
</tr>
<tr>
<td>17</td>
<td>12/10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>