OM 303 004: Operations Management (12616)

Spring 2019 Course Syllabus

Dr. Harvey Singer

Class Location: James Buchanan Hall room D023 (BUCHAN D023)
Class Session: Mondays and Wednesdays from 7:30 to 8:45 AM (except during Spring Break)

Office Location: Enterprise Hall (ENT), Room 137.
Office Hours: Monday and Wednesday from 11:00 AM to 12:00 Noon and from 3:00 to 4:00 PM; Tuesday from 5:00 to 6:00 PM; or by appointment. (Schedule subject to change without prior notice.)
Phone: (703) 993-1798.
Fax: (703) 993-1809.
E-mail: hsinger@gmu.edu
Website: https://mymasonportal.gmu.edu

Schedule: The official Spring 2019 Semester calendar from the University Registrar can be downloaded from https://registrar.gmu.edu/calendars/spring-2019/.

Course Text
This section of OM 303 REQUIRES both MyOMLab and the textbook: Principles of Operations Management, 10th edition, by Heizer, Render, and Munson.
There are three options for these as listed below. You may purchase them at the bookstore or from Pearson directly. You may have either the electronic book or a physical book but you must have the MyOMLab access as well.
• MyOMLab with e-text access code card ISBN 9780134184111.
  o MyOMLab includes the e-book of the bound version of the textbook.
  o This option will require the MyOMLab access code to be purchased separately

Notes:
1. The text is required reading but it is not a substitute or replacement for classroom instruction.
2. The 10th Edition supersedes and replaces all previous editions.
3. Do NOT get the “international” edition, as it is different from the 10th edition.
4. I will not support any edition of the textbook other than that stated above.

Course Description
This School of Business core course provides an examination of the principal functions of operations managers in various settings, with strong emphasis on service operations, in regard to how they operate and function. Analytic models are used to describe key planning and control
activities. Operations management (OM) is responsible for the production of goods and services in an organization. It not only has a significant impact on other areas such as marketing, finance, and accounting within an organization, but more importantly, also impacts the external customers of the organization. It is therefore no surprise that the performance of an organization is often largely determined by the performance of its operations area. To gain competitive advantage, operations managers pursue effectiveness and efficiency in value-adding processes at both not-for-profit and for-profit organizations. This course exposes students to a wide range of OM subjects including operations strategy, process selection, lean management, project management, quality management, inventory control, and supply chain management. Students develop both qualitative and quantitative OM skills through course lectures, class discussions, homework exercises, and in-class demonstrations.

Course Prerequisites
1. BUS 210, ACCT 203, MATH 108, with a grade of C or better, and sophomore standing.
2. Prerequisites are solely and strictly enforced by the Office of Academic Advising without input from me. Students not meeting the prerequisites will be dropped without input from me.
3. Proficiency in elementary algebra is essential and is expected. Deficiencies in elementary algebra should be self-remediated.
4. Familiarity with your calculator, EXCEL, and other MS Office applications is expected. Deficiencies should be self-remediated.

Course Registration
1. I have no authority to resolve any issues concerning student registration. All matters relating to course registration are the exclusive domain of the Office of Academic Advising, and are handled solely by them without input from me. Academic Advising is located on the lower level of Enterprise Hall in room 008 (ENT 008). Contact Academic Advising by phone at 703-993-1880 or send e-mail to masonbus@gmu.edu.
2. There are no force-adds or schedule adjustments in the School of Business.
3. Students must be officially registered for the course to receive a grade. Students are solely responsible to verify their own registration status.
4. This course requires a minimum grade of C to satisfy the School of Business degree requirements, and students will not be permitted to make more than three attempts to achieve a C or higher in this course. Registration in this course is prohibited beyond three attempts that resulted in a grade lower than C. If you have questions about this policy, please see an academic advisor in OAS.

Undergraduate Program Learning Goals (Goals addressed in this course are in bold)
1. Our students will demonstrate an understanding of the social, global, ethical, and legal contexts of business and will be able to reflect on the role of the individual in business.
2. Our students will demonstrate an understanding of and the ability to apply knowledge of professional skills necessary for success in business including effective business writing.
3. Our students will demonstrate technical and analytic skills appropriate for success in business.
4. Our students will demonstrate an understanding of and the ability to apply knowledge of core business disciplines including accounting, finance, information systems, management, marketing, and operations management.
5. Our students will demonstrate knowledge and skills appropriate for specialization in their majors.
6. Our students will demonstrate an understanding of how research in the business disciplines
contributes to knowledge and how such research is conducted.

Course Objectives
Consistent with School of Business Undergraduate Program and ISOM goals, specific course objectives are for the student to:

- To master the essentials of the concepts and methodologies of the tools of operations and supply chain management, particularly regarding service operations.
- To gain a sound basis in operations and supply chain management by applying the concepts and methodologies presented in the course to solve practical business problems.
- To foster critical thinking and independent problem solving skills. Specifically, to gain the ability to independently analyze operational business data and to model business situations, and to understand and learn from the data.
- Understand the components of operations and supply chain management and how they are related to other major business decision areas.
- To raise awareness of ethics in the practice of operations and supply chain management.
- Analyze and improve business processes by using quantitative and qualitative tools.
- Learn project management techniques.

Course Approach
1. Geared for the future business professional engaged in decision support and/or decision making. The emphasis is on practical business applications rather than on technical rigor. The format will be lectures, but discussions and questions are highly encouraged.
2. As the instructor, I am responsible for teaching the best course possible, including providing the best possible resources which promote learning. Students are individually and solely responsible for their own learning, including the application of the information presented, as demonstrated by performance on the graded homework, quizzes, and exams. I will use my office hours to meet with students individually to work with them on a one-to-one basis to help their understanding and mastery of the material.

Learning Tools for the Course
Lectures: It is expected that each student be prepared for class including having read and prepared assigned material. My teaching philosophy is based on the belief that learning is an active process. To be successful in learning the concepts, you must be actively engaged in the material. My lectures are interactive. The purpose of the classroom experience is to help you better understand and apply the concepts you have learned from the text, readings, and homework. We will use exercises and a discussion-oriented lecture format to help us to do this.

Participation and Attendance in Class: Attendance in this class is highly recommended in order to be successful in learning the course content. Students are expected to be on time and attend all class sessions. Participation will be graded on a regular basis. The quality of contribution is more important than the quantity of “airtime.” Students will often be called on at random to participate in the class discussion and solutions for in class activities. I expect everyone to be attentive during class and add to everyone else’s learning experience by voluntarily participating in discussions, asking questions, answering questions, bringing in real-world examples pertinent to class topics. Note that participation credit cannot be obtained unless you are in class. The student is solely responsible for all assignments and material presented in class even if missed due to absence.
**In-class Exercises:** These are in-class learning experiences, possibly completed in a group environment. In-class exercises are designed to reinforce the topics learned in the class. Students are typically given a fixed amount of time to complete each exercise. In-class exercises will occur at random, so you will not know when one will take place in class. Full credit is given if you are present in class and attempt the exercise. They are not graded for correctness. Make-up in-class exercises are not allowed under any circumstances. Therefore, missing a class may entail missing points.

**Homework Assignments:** Homework may be assigned at any time during the semester, usually at the end of a chapter. Homework assigned via MyOMLab will be due weekly (as specified by the Professor and posted in MyOMLab) after the homework topic covered in class. The specific assignments will be posted on MyOMLab and the due dates indicated within MyOMLab. Late homework will be accepted up to 5 calendar days after it is due with a penalty of 10% per day late. Homework submitted after the 5-day late period will receive a score of zero. For example, if homework is due Monday by 11:59 PM and it is completed by Tuesday at 11:59 PM, the maximum that can be earned is 90%. The last day the homework could be submitted in this example would be Saturday at 11:59 PM for a maximum of 50%; after that time, it receives a score of zero. Please note that these are INDIVIDUAL assignments and by the Honor Code discussed below you are to complete them as such. The assignments may reference one or more chapters.

**MyOMLab:** Mastery of the subject matter is measured by skill and proficiency in problem solving. Proficiency is gained by practice. The assigned problems should be considered the minimum amount of practice. To help you gain mastery, MyOMLab offers additional resources such as the Study Plan and the Dynamic Study Modules. You are highly encouraged to use these resources for practice and understanding of the topics.

**Quizzes:**
1. Five (5) mandatory, scheduled, quizzes will be given in class (at any time during the class).
2. Each quiz has a maximum point value of 40 points.
3. A blank Scantron form, calculator, and #2 pencil are needed for each quiz; these items are the sole responsibility of the student.
4. A quiz is generally a set of multiple choice or T/F questions, and may also consist of word problems. Quizzes may test your knowledge of any topics covered in the class lectures or in the reading assignments. Each individual quiz contributes the points scored (out of 40 points) to the final course score.
5. Use of the textbook, class notes, etc., during quizzes is prohibited unless otherwise stated by the instructor.
6. All quizzes are individual efforts. Absolutely NO collaboration of any kind is permitted. Any collaboration will be treated as an Honor Code violation.
7. **No quiz grades will be “dropped” – the scores earned on each of all five quizzes will be retained “as is” as the grades of record for the calculation of the total final course score.**

**Examinations:** During the semester, there will be two midterms given during the regular class period and one final examination. Exams will test concepts, technical skill, and critical thinking. The exams may consist of true/false, multiple choice, short answer questions, and/or word problems. Technical material will be covered by word problems; each problem may itself contain several or many parts. Partial credit for word problem solutions may be awarded, as appropriate. The midterms and final examination are closed book and closed note exams. I will provide a
formula sheet. Information presented in class, videos, slides, the textbook, and by any guest speakers may be included on the examinations. You must bring a blank Scantron form, calculator, and #2 pencils to each exam.

The first midterm, Exam 1, will tentatively cover the material presented from Chapters 1 to 4. Exam 1 contributes the points scored (out of 200 points) to the final course score. The second midterm, Exam 2, will tentatively cover material presented from Chapters 5 to 9. Exam 2 contributes the points scored (out of 200 points) to the final course score. The Final Examination is cumulative and is given only at the specified time as published by the University Registrar. IF YOU CANNOT TAKE THE FINAL OR MIDTERMS AT THE TIME SHOWN ON THE SCHEDULE, DO NOT REGISTER FOR THIS CLASS. The Final Exam contributes the points scored (out of 400 points) to the final course score.

All exams are strictly an individual effort. Absolutely NO collaboration or sharing of any kind, in any manner, by any means is permitted. Absolutely NO external materials not authorized by the instructor are permitted. These constitute Honor Code violations which will be pursued aggressively and with great vigor.

- Exam 1: Fundamentals and basic concepts of operations (worth up to 200 points).
  - In class in BUCHAN D023 on Wednesday, March 6, 2019.
    - Date is tentative and subject to change.
  - Maximum point value = 200 points.
- Exam 2: Designing operations.
  - In class in BUCHAN D023 on Wednesday, April 10, 2019.
    - Date tentative and subject to change.
  - Maximum point value = 200 points.
- Final Exam: Cumulative.
  - Wednesday, May 8, 2019, from 7:30 to 10:15 AM in BUCHAN D023.
    - Date NOT subject to change except by order of the University Registrar.
  - Maximum point value = 400 points.

**Quiz and Exam Grading:** The instructor will review every quiz and exam (except the Final Exam) in class, usually at the next class meeting. Any student wanting further review or wishing to appeal the grade on any course deliverable can do so during office hours or by appointment. The student must confirm the meeting by email to the instructor. All grades are considered final one week after being posted to Blackboard. It is the student’s responsibility to check the website frequently. Once final course grades are submitted, changes to grades will only be made to correct errors in tallying scores.

**Missed Exam or Quiz:** A missed exam or quiz will be assigned a score of zero. A missed exam or quiz may be made up only under extreme circumstances, WITH supporting documentation (valid documented excuse per university policy) AND at the sole discretion of the instructor. One and only one make-up exam or quiz is allowed. (See the “Make-ups” paragraph below).

**Make-up Exam or Quiz:**
1. One and only one (1) missed exam or quiz can be made-up.
2. Taking a make-up is not automatic. You must qualify and register for any make-up with the instructor. You must provide a valid and bona fide reason (per university policy) for missing
the exam or quiz when it was originally scheduled, supported and verified by documentation. All decisions are final; there is no appeal.

3. Re-testing to replace scores already earned on tests is strictly prohibited and will not be allowed under any circumstances.

4. Make-ups may be of a different format and level of difficulty than the original exam or quiz.

5. A missed exam or quiz will be assigned a score of zero until it is made-up. After the make-up, the grade on the make-up will replace the zero, to be added into the final total course score.

**Course Website on Blackboard**
1. The OM 303 course website is an electronic medium to facilitate the transfer and dissemination of the course content. Specifically, it is provided as a repository of course content and information so as to augment classroom teaching. The website is not a substitute or replacement for attending class. The course website contains this syllabus; announcements and assignments, PowerPoint presentations, supplemental notes; and student grades. **Note that the classroom presentations may be condensed and abridged versions (with shortened coverage and content) of the corresponding presentations available on the website.**

2. The website is continually being maintained. During the semester, new documents may be created and existing documents may be modified as appropriate. Important course announcements will be posted on the “Announcements” folder. **You should check this course site on Blackboard often, at least twice a week.** The student is solely responsible for the information contained these announcements.

3. Students will be informed beforehand of the pertinent documents for the next class. It is recommended that students download the pertinent course documents before class and well before exams and assignment due dates. I recommend that you annotate my documents with your own notes as appropriate during class.

4. The course website is an electronic medium to facilitate the transfer and dissemination of the course content. It is provided solely to augment classroom presentation and discussion of the material. The website is not a substitute or replacement for attending class.

5. Students should frequently check MyOMLab for new assignments and for individual study. The student is solely responsible for submitting all course deliverables on their due date.

6. All course related documents posted to the OM 303 course website constitute permanent attachments to this syllabus once they are promulgated in this fashion.

**Academic Integrity**
George Mason University shares in the tradition of an honor system that has existed in Virginia since 1842. The Honor Code is an integral part of university life. On the application for admission, students sign a statement agreeing to conform to and uphold the Honor Code. Students are responsible, therefore, for understanding the provisions of the code. In the spirit of the code, a student's word is a declaration of good faith acceptable as truth in all academic matters. Cheating and attempted cheating, plagiarism, lying, and stealing of academic work and related materials constitute Honor Code violations. To maintain an academic community according to these standards, students and faculty must report all alleged violations of the Honor Code to the Honor Committee. Any student who has knowledge of, but does not report, an Honor Code violation may be accused of lying under the Honor Code. All students are expected to adhere to this code. In summary:

1. Students are obligated to strict adherence to the University honor system and code as described in the University Catalog. You are bound by the code to neither receive nor furnish any assistance of any kind on any graded assignment, test, or quiz.
2. Specifically:
   - All work submitted for a grade, including tests, quizzes, and homework, are to be completed individually, on your own, and alone. Study groups are encouraged but all work submitted for a grade must be your own.
   - Communication and collaboration, or suspicion thereof, of any kind between students during tests and quizzes is strictly and absolutely forbidden.
   - Any evidence or suspicion of collaboration on graded work will be construed as an honor code violation.

3. Any violations of the honor code will be reported as required to the Office of Academic Integrity. School of Business recommended sanctions will be used. See the table below (at http://business.gmu.edu/media/com_managedlists/72/honor-code-violation-recommendations.pdf.) Honor code violations will be aggressively pursued with great vigor.

<table>
<thead>
<tr>
<th>Type of Violation</th>
<th>First Offense</th>
<th>Second Offense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plagiarism—failure to cite/attribute sources</td>
<td>An F in the class; multiple visits to the Writing Center required; and Academic Integrity Seminar Attendance</td>
<td>An F in the class; multiple visits to the Writing Center required; Academic Integrity Seminar Attendance; dismissal from the program; and possible suspension or expulsion</td>
</tr>
<tr>
<td>Plagiarism—representing someone else’s work as the student’s own</td>
<td>An F in the class; multiple visits to the Writing Center required; and Academic Integrity Seminar Attendance</td>
<td>An F in the class; multiple visits to the Writing Center required; Academic Integrity Seminar Attendance (at times of hearing and reenrollment if relevant); dismissal from the program; and possible suspension or expulsion</td>
</tr>
<tr>
<td>Cheating on an assignment, homework, class participation, or minor project</td>
<td>An F in the class; and Academic Integrity Seminar Attendance</td>
<td>Expulsion</td>
</tr>
<tr>
<td>Cheating on a major project, test, or exam</td>
<td>An F in the class; Academic Integrity Seminar Attendance; and at least one semester suspension</td>
<td>Expulsion</td>
</tr>
<tr>
<td>Egregious Violation [e.g., stealing an exam; submitting coursework from another class as original work; lying to an employer about academic performance]</td>
<td>Dismissal from the program; at least one year suspension; and attendance at Academic Integrity Seminar at the time of hearing and just prior to reenrollment</td>
<td>Expulsion</td>
</tr>
</tbody>
</table>

Note: The Academic Integrity Seminar used by the Office of Academic Integrity costs $100.

Disability
All academic accommodations due to disability must be arranged by the student with the Office of Disability Services (ODS); contact ODS at 703-993-2474 or send e-mail to ods@gmu.edu. I will cooperate with ODS to the greatest extent possible to accommodate a student’s special needs.

Connectivity
1. It is the student’s responsibility to have reliable and adequate Internet connectivity and access (including GMU computers available on campus).
2. Some sessions may require a computing device as required by the School of Business laptop policy (http://business.gmu.edu/undergraduate/policiesproceduresforms/). These sessions will be announced.
3. For technical assistance, visit the ITU Support Center.

Class Etiquette
Be courteous to and respectful of others in class. Please be sure to turn all cell phone ringers off. Cell phones, pagers, and other communicative devices are not allowed to be used during class. Please keep them stowed away and out of sight. Laptops or tablets may be permitted for the purpose of taking notes only; engaging in activities not related to the course (e.g., gaming, email, chat, etc.) will result in a significant deduction from your participation grade.

Class Participation
1. Performance is highly associated with class attendance and participation.
2. Students are expected to attend all scheduled classes.
3. Class participation consists of active engagement in the presentation of material and through questions and discussions.
4. The student is solely responsible for all assignments and material presented in class even if missed due to absence.

E-mail Contact
All communications from me to you will be directed via e-mail or Bb announcements. I will address all of my e-mails and replies ONLY to your Mason (@gmu.edu) e-mail address for concerns of privacy and confidentiality. If you use another e-mail account as your primary e-mail, please be sure to forward your GMU e-mail to and from that account.
1. I communicate remotely with students only by Mason e-mail. I will not reply to voice mail messages left on my GMU office telephone.
2. For security and confidentiality, I will only reply only to Mason e-mail addresses.
3. I will only reply to student e-mail that is signed with your full name and that states your course and section.
4. Expect a response to an e-mail within 1 to 2 days after I read it. I only respond to student e-mail during business hours Monday to Friday; I do not respond to e-mail after business hours. I do not respond to email on the weekends.

Grading Metrics
1. Grades are determined by the number of points accumulated during course up to 1150 points. The grading scale is below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>100</td>
</tr>
<tr>
<td>In class exercises/class participation</td>
<td>50</td>
</tr>
<tr>
<td>Quizzes (5)</td>
<td>200</td>
</tr>
<tr>
<td>Midterm Exam #1</td>
<td>200</td>
</tr>
<tr>
<td>Midterm Exam #2</td>
<td>200</td>
</tr>
<tr>
<td>Final Exam</td>
<td>400</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1150</strong></td>
</tr>
</tbody>
</table>
2. A numerical final course total score is calculated as the sum of scores earned.
3. The final course letter grade is assigned objectively and strictly according to the numerical final course total score. (See “Course Grade” below. Maximum points = 1150)
4. There is no “extra credit” of any kind, for any reason. Final total point scores are NOT “bumped” or rounded up to the next higher letter grade.
5. All students should obtain blank Scantron forms that will be used for the exams and quizzes.

Course Grade
1. This course requires a minimum grade of C to satisfy School of Business degree requirements, and students will not be permitted to make more than three attempts to achieve a C or higher in this course. Registration in this course will be prohibited beyond three attempts that resulted in a grade lower than C.
2. Students must be officially registered in this section to receive a grade.
3. Final course grades are assigned rationally, objectively, and strictly on the sole basis of a student’s performance in the class as measured by the numerical total point score which is the sum of the scores earned on all tests, quizzes, and graded homework assignments.
   ➢ Outside influences and obligations will not be factored into the course grade.
4. Final course grades will be assigned as whole letters, WITH plus and minus.
5. Final course letter grade assignments on the 1150 point system are given in the table below. That table will be adhered to strictly and without deviation or compromise.

<table>
<thead>
<tr>
<th>COURSE TOTAL SCORE *</th>
<th>COURSE GRADE</th>
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<tbody>
<tr>
<td>FROM</td>
<td>UP TO</td>
</tr>
<tr>
<td>1127</td>
<td>1150</td>
</tr>
<tr>
<td>1070</td>
<td>1126</td>
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<tr>
<td>1035</td>
<td>1069</td>
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<td>1012</td>
<td>1034</td>
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<tr>
<td>955</td>
<td>1011</td>
</tr>
<tr>
<td>920</td>
<td>954</td>
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<tr>
<td>897</td>
<td>919</td>
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<tr>
<td>828</td>
<td>896</td>
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<tr>
<td>805</td>
<td>827</td>
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<tr>
<td>690</td>
<td>804</td>
</tr>
<tr>
<td>0</td>
<td>689</td>
</tr>
</tbody>
</table>

*Point ranges are inclusive.

6. Final total point scores are NOT “bumped” or rounded up to the next higher letter grade. Specifically, a final total point score of 827 will be assigned a course grade of C- and not C. (Note that a grade of C- is unsatisfactory in School of Business.)
7. There is no “extra credit” of any kind, for any reason.

Incompletes
An incomplete will only be given to a student who has completed a majority of the work for the semester, has a course grade of C or better in the work completed at the time of the request, and has a documented excusable reason such as a serious illness or unanticipated family emergency for being unable to complete the remainder of the work as scheduled. Poor time management,
vacation plans, or failure to deal with a situation earlier in the semester will not be accepted as reasons for an incomplete.

**Special notes regarding the Final Exam**
1. In conformity with the official Spring 2019 Final Exam Schedule promulgated by the Office of the University Registrar (at [https://registrar.gmu.edu/calendars/spring-2019/final-exam-2/](https://registrar.gmu.edu/calendars/spring-2019/final-exam-2/)) the Final Exam, is scheduled to be given on Wednesday, May 8, 2019, and only that date and none other, from 7:30 to 10:15 AM in BUCHAN D023.
2. Requests to move the Final Exam to accommodate vacation plans, regardless of who made them or when, will be denied automatically. Make all arrangements or rearrangements ASAP (meaning NOW) for taking the Final Exam on Wednesday, May 8, 2019, at the assigned place and at the assigned time.
3. Requests to move the Final Exam because of exam conflicts or because of medical or family emergencies can only be resolved through the Office of Academic Advising (and not me) at least one week prior to the date of the final with the appropriate paperwork and documentation. The deadline is strictly enforced.

**Topics**
1. The tentative list of topics is given below. The list follows the basic order and coverage of topics in the required text.
2. The list of topics is subject to change during the semester. Some sections in the text will be skipped, as announced. Some material not contained in the text may be presented in class, as will be noted.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part I Basics of Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Introduction to Operations Management</td>
<td>1</td>
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<tr>
<td>- Nature of services</td>
<td></td>
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<tr>
<td>- Types of operations</td>
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<tr>
<td>Operations Strategy in a Global Environment</td>
<td>2</td>
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<tr>
<td>Project Management</td>
<td>3</td>
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<tr>
<td>Forecasting</td>
<td>4</td>
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<tr>
<td><strong>Part II Designing Operations</strong></td>
<td></td>
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<tr>
<td>Design of Goods and Services (and Supplement)</td>
<td>5</td>
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<tr>
<td>Managing Quality (and Supplement)</td>
<td>6</td>
</tr>
<tr>
<td>Process Strategy (and Supplement)</td>
<td>7</td>
</tr>
<tr>
<td>Location Strategies</td>
<td>8</td>
</tr>
<tr>
<td>Layout Strategies</td>
<td>9</td>
</tr>
<tr>
<td><strong>Part III Managing and Maintaining Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Supply Chain Management</td>
<td>11</td>
</tr>
<tr>
<td>Inventory Management</td>
<td>12</td>
</tr>
<tr>
<td>Short Term Scheduling</td>
<td>15</td>
</tr>
<tr>
<td>JIT, TPS, and Lean Operations</td>
<td>16</td>
</tr>
</tbody>
</table>