Section I: The Request

University of Utah requests approval to offer a B.S. degree in operations management effective Fall 2010. This program has been approved by the institutional Board of Trustees on XX Month 2009.

Section II: Program Description

Complete Program Description

The Operations Management (OM) major will be offered through the Operations and Information Systems (OIS) Department within the David Eccles School of Business (DESB). The major will prepare students for a career in OM. OM is concerned with the implementation of business plans and the continuous improvement of day to day business processes. OM is critical to many industries, including the manufacturing, services, health care and education industries. Almost all major companies have complex operations which need to be managed well to maximize company profits. Core topics include (but are not limited to) productivity, project management, product design and innovation, process design and management, supply chain management, quality control and management, capacity planning, resource planning, scheduling and inventory management. Practitioners need to have a strong foundation in modeling and data analysis. The OM major will provide graduates with state of the art content knowledge, as well as the analytic problem-solving skills needed to confidently pursue fruitful careers as operations managers or consultants.

Currently the Management Department offers a Management degree and it is possible to emphasize OM within that degree. Hence the majority of the classes that will be offered as a part of the new major are already in place. (Recently, the OIS Department was formed within the DESB and has become the home for the courses formally taught by the Management Department and used for the OM emphasis.) Given that the new major will be part of the DESB, all OM majors will be required to complete pre-business and intermediate business classes. As with other majors within the School, the major classes will be part of the students' final year and will account for 15 hours of credit. The classes specific to the major are listed in Appendix A.

Purpose of Degree

The purpose of the OM degree is to give students the necessary knowledge and skills to be successful operations managers. Besides giving students knowledge of the core areas of OM, the major will help create graduates with strong analytical and problem solving skills that will be valuable assets long into their future. As elaborated upon more below (see the Labor Market Demand and Student Demand sections), there is growing demand for graduates in OM. The state of Utah and the region are seeing growth in manufacturing and service firms that have a need for experts in operations.

It is also true that most of our peer and aspirant Business Schools offer degrees in operations management. We feel that local employers are forced to go beyond the University of Utah to find qualified applicants for their positions. To be competitive as a Business School, we need to offer degrees in all of the major functions of business. Without the proposed degree, there is an obvious hole in what we can offer to employers.

Institutional Readiness

Because there is already an OM emphasis within the Management Department, the transition to the new major should be very straightforward. The majority of classes already exists and can be taught with

existing faculty. Similarly, the undergraduate office within the DESB already offers counseling to business students and should be able to advise students in the new major without additional resources.

Faculty

As of July 1, 2009, the Operations and Information Systems (OIS) Department has twelve tenure-track and five lecturing faculty members. Of those, six tenure-track and two lecturing faculty teach classes in operations. (One of the six tenure-track members is the new Dean of the DESB and hence will not be teaching classes for the next several years.) The faculty size we currently have is sufficient to offer the new degree as proposed, although more faculty are desirable to allow us to offer more electives. We anticipate that over the next five years, we will have the resources to hire a net increase of two regular full-time, tenure track faculty members to expand our offerings.

Staff

In early 2009 the OIS Department was formed, which included the addition of an administrative assistant (AA). The current AA already oversees scheduling classes and assisting faculty that are part of the proposed major; hence we do not anticipate any change in staff size for the department. As described above, the DESB provides student advisors and other support staff and we don't anticipate needing any other staff.

Library and Information Resources

Because we have had operations management faculty as part of the Management Department (and now OIS Department) for many years, we have been able to obtain the library resources necessary to support both teaching and research needs. Moreover, historically the University had an industrial engineering department, and many of the library resources for that department and major have served and will continue to serve the new major.

Admission Requirements

The admission requirements to the major will be the same as those for other majors within the DESB.

Student Advisement

As mentioned above, the student advisement function in the DESB is centralized. The staff work with all majors within the School. We anticipate that the current staff of the Undergraduate Advising Office will be able to serve students in the new major without additional resources.

Justification for Gradation Standards and Number of Credits

The graduation requirements will be consistent with Univeristy guidelines and requirements for other majors within the DESB. Some of the requirements that are specific to the School include 40 semester hours of upper division credit, a 2.0 or better GPA in upper division business classes, and at least a C-grade in all business courses.

External Review and Accreditation

No outside consultants were involved in the development of the program. We contemplate the possibiltiy of an advisory board from industry, but at this point it does not exist. We anticipate that such a board would assist in curriculum review and development as well as internship and job placement advice and opportunities. As part of the DESB, the new major will be part of a School review by the Association to Advance Collegiate Schools of Business (AACSB) and the School's National Advisory Board. The next AACSB review to which the School will be subject is beginning now.

Our department will not be accredited separately from the DESB. The AACSB (our accrediting body) assesses us on two measures: (1) participating faculty, which is an indicator of faculty engagement, and (2) academic qualifications, which is an indicator of faculty currency and contributions to knowledge, which is important for us because we are a research mission school. There are no fixed standards, but since we are a graduate institution, we are expected to hit a higher standard. The AACSB does not proscribe a student-to-faculty ratio.

Projected Enrollment

Year	Student Headcount	# of Faculty*	Student-to-Faculty Ratio	Accreditation Req'd Ratio
1	15	8	1.9	-
2	25	9	2.8	-
3	35	9	3.9	-
4	50	9	5.6	-
5	60	9	6.7	-

* The number of faculty indicated in the table is the number of full-time faculty teaching OM classes. The total department faculty is approximately twice the number shown.

Expansion of Existing Program

Because we are expanding an emphasis into a major, rather than expanding a current major, we do not have information on current enrollment or student credit hours (SCH). (The emphasis is actually quite new and we did not ask the Undergraduate Advising Office to collect information from students on their emphasis.) We have SCH information on current classes, but those classes serve the entire DESB (and beyond in some cases), so they do not indicate the number of students who will be transitioning from the current emphasis to the proposed major.

Section III: Need

Program Need

As highlighted below, there is both student interest and market demand for graduates in OM. We have had cases in the recent past where potential employers such as IM Flash Technologies have come to recruit graduates for their job openings, and it has been difficult to meet their needs. Because OM is one of the core functions of any business, many companies have an ongoing need for operations management personnel. The state of Utah continues to attract companies from many industries and of many different sizes and we want to be poised to fill their needs for operations managers. We should emphasize here that OM is not just about manufacturing; it is relevant in service, healthcare, government and non-profit industries.

We also feel that the proposed major is necessary to stay competitive with top business schools. Most of the top schools offer OM as a major. We recently had a group of managers from Intermountain Health come to recruit what they call "management engineers." They would like to recruit locally, but have not been able to find qualified candidates. Hence they have to go outside the local market to find the right people. Graduates from the proposed OM major would be able to meet their needs. We believe that they are not unique and therefore want to provide local businesses a pool of candidates to help fill their requirements in operations management.

Labor Market Demand

We queried several websites to obtain a snapshot of current demand for individuals with operations management skills. The following tables and screenshots show the results. In all cases, the source of the information is given either above or below the table or figure. Tables showing job openings are for 2008. 2009 numbers are lower, but we feel that they are not representative of what our students will face at the time of graduation due to the current economic downturn. The data collected also reveal that operations managers are well compensated (and these data were updated with the most recent numbers). As we are able to communicate that fact to students, we believe that demand for the major will increase. Appendix D shows some sample job openings

The first exhibit is a screen shot taken April 4, 2008 from the American Production and Inventory Control Society's webpage. We have highlighted job openings most closely related to OM with the red boxes.

Position Openings in Fields Related to Operations Management in Utah

Position	State	Number of Openings
Operations Management	Utah	154
Project/Program Management	Utah	42
Manufacturing/Production/Operations	Utah	152
Logistics/Transportation	Utah	80
Quality Assurance/Safety	Utah	60
Retail/Wholesale	Utah	236
Source: Monster.com, April 10, 2008 Total number of positions across 6 categories above 553		

National Salaries (see Appendix D for descriptions of the occupation codes)

Occupation (SOC code)	Employment	Median Hourly	Mean Hourly	Mean Annual
Industrial Production Managers (11-3051)	154,030	$40.04	$43.85	$91,200
General and Operations Managers (11-1021)	1,697,690	$44.02	$51.91	$107,970
Purchasing Managers (11-3061)	67,150	$42.86	$45.34	$94,300
Transportation, Storage, and Distribution Managers (11-3071)	96,300	$37.98	$40.64	$84,520
Medical and Health Services Managers (11-9111)	258,130	$38.58	$42.67	$88,750
Logisticians (13-1081)	98,590	$31.96	$32.98	$68,600
Operations Research Analysts (15-2031)	60,860	$33.17	$35.68	$74,220
Statisticians (15-2041)	20,680	$34.91	$35.96	$74,790
SOC code: Standard Occupational Classification code – see http://www.bls.gov/soc/home.htm Data extracted on June 11, 2009 Period: May 2009				

Utah Salaries (see Appendix D for descriptions of the occupation codes)

Occupation (SOC code)	Employment	Median Hourly	Mean Hourly	Mean Annual
Industrial Production Managers (11-3051)	1,160	$36.71	$40.30	$83,820
General and Operations Managers (11-1021)	(Not released)	$33.69	$40.11	$83,440
Purchasing Managers (11-3061)	390	$38.44	$40.64	$84,530
Transportation, Storage, and Distribution Managers (11-3071)	990	$34.21	$35.90	$74,670
Medical and Health Services Managers (11-9111)	2,020	$38.89	$41.45	$86,220
Logisticians (13-1081)	1,590	$31.33	$31.62	$65,770
Operations Research Analysts (15-2031)	570	$25.39	$27.04	$56,240
Statisticians (15-2041)	170	$28.78	$28.65	$59,580
SOC code: Standard Occupational Classification code – see http://www.bls.gov/soc/home.htm Data extracted on June 11, 2009 Period: May 2008				

Student Demand

Student demand is a key factor in the success of a new program. The OM market demand indicators show the potential for a strong market, which we believe will fuel long-term growth of the program as more job opportunities are created and recruiters witness the demand for these students.

Immediate and local student demand is what we have attempted to gauge. The University of Utah has historically had a large portion of commuter students and tends to populate its undergraduate programs with local students. Due to this type of student feeder system, gauging the interest of our current student population through a survey seemed most appropriate.

Survey Information

Participant Search

Students were sent an invitation for an online survey. The students receiving the survey were undergraduate students in current Operations Management courses. These courses were selected because they contain a broad cross-section of business students both from major and class perspectives because these classes are required for all business majors.

Survey Format

The survey was conducted near the beginning of the Spring 2008 semester online using SurveyMonkey. A link was emailed out to each student either through WebCT if the instructor used WebCT heavily or through class email lists if WebCT was not used heavily. The following is the detail of the survey:

Survey Responses

Question 1 – If the Business School offered a four-year undergraduate degree in Operations Management, how interested would you be in earning that degree?

I would definitely pursue that degree.	1%	2
I would STRONGLY consider that degree.	14.5%	30
I would consider that degree.	46.9%	97
I would not be interested in that degree.	37.7%	78

Question 2 – If you selected that you would not be interested, please select the most applicable reason why you are not interested.

I am not planning on pursuing a business degree.	0.7%	1
I have chosen a different degree and am too far along to change.	39.2%	55
I am not interested in Operations Management.	57.1%	80
Had I known about this earlier at the Freshman level, I may have opted for it	2.9%	4

Question 3 – Which of the following jobs might you be interested in as a career, if you chose a degree in Operations Management?

Supply Chain Manager	14.9%	29
Inventory Manager	16.9%	33
Materials Manager	13.8%	27
Products/Project Manager	46.2%	90
Process Improvement Leader (Six Sigma)	30.3%	59
Workforce Scheduling Manager	10.8%	21
Forecasting Manager	29.2%	57
Management Consulting	62.6%	122

Question 4 – When everything is said and done, would you be interested in the Operations Management Major?

Yes	23.4%	48
No	38.5%	79
Undecided at this time	38.5%	79

Question 5 – What is your current major? (If double major check first priority).

Accounting	26.7%	55
Business Administration	10.2%	21
Entrepreneurship	2.9%	6
Finance	29.6%	61
Information Systems	7.3%	15
Management	11.2%	23
Marketing	11.2%	23
Non-Business Major	1.5%	3
Undecided	3.4%	7

Question 6 – What is your current status?

Freshman	1.5%	3
Sophomore	26.7%	55
Junior	52.9%	109
Senior	18.9%	39

Question 7 – Regardless of your major, the following classes are being taught by Professor Mughal during next Fall and Spring: Mgt-5450 Operations Simulations Mgt-5610 & 5611 Practical Management Science The pre-requisite to both classes is Mgt-3440 (Stat II). Would you be interested in taking these classes as electives for your major?

Yes	39.0%	80
No	31.7%	65
Undecided at this time	30.7%	63

Results/Conclusions

We had 203 responses to the OM degree survey from students of the introductory statistics and core operations management classes. Over 71% of these responses were from students who identified themselves as juniors or seniors. While not all of these students may be formally part of the upper division, the prevalence of upper classmen may indicate that most of these students have already committed to an existing degree. Nevertheless, 48% indicated that they would consider an OM degree, and 14% indicated that they would strongly consider an OM degree. Of those who indicated that they had no interest in an OM degree, 54% indicated that they had already chosen an existing degree and were too far along to change.

Importantly, 62% of respondents were interested in a career in management consulting, and 46% were interested in a career as a project manager. Both of these occupation categories exhibit employment growth, high starting salaries, and generally require a background in traditional operations management skill sets.

Overall we interpret these results to indicate that there would be a strong interest in an OM degree from students who have not yet committed to another degree program.

Similar Programs

Utah State University offers a degree in OM that has about 20-25 majors per year as reported by one of their faculty members (Vijay Kannan). Weber State University offers a Business Administration degree with an emphasis in supply chain management, which is similar to our current emphasis, but the focus on supply chain makes it much more specialized. Based on our investigation, we did not find any other offerings at other System-of-Higher-Education schools.

We believe that offering an OM major at the University of Utah will complement what Utah State and Weber State do by providing more Utah residents an opportunity to prepare for a career in operations management. The programs at those schools are small and pull from a different student population than does the University of Utah.

Benefits

A major in Operations Management will benefit the University of Utah and the Utah System of Higher Education by attracting students to an area of study that has been underrepresented at the University and in the state. The major can appeal to students who are interested in both business and engineering, but have heretofore been unable to find a home for their interests. The major should also allow us to create and strengthen relationships with local industry by providing graduates who can fill a need that has been filled in the past with people from other institutions (mostly outside the state). The salaries that graduates are likely to earn are high, which will hopefully allow alumni to give back to the University in the future.

Consistency with Institutional Mission

"The mission of The University of Utah is to serve the people of Utah and the world through the discovery, creation and application of knowledge; through the dissemination of knowledge by teaching, publication, artistic presentation and technology transfer; and through community engagement." The establishment of the new major will further enhance the already strong contribution of the OM faculty to this mission. As envisioned by President Young, we anticipate that many students will want to have one-on-one experiences with faculty, where they can assist in the research mission. Providing a needed major directly contributes to the teaching and dissemination-of-knowledge missions. Growth in the program should allow us to expand the size of our faculty, which in turn will allow us to offer courses that we have not been able to offer before. More specifically, we will be able to do the following more effectively:

• Discover and disseminate a combination of technical and business knowledge through real-world-oriented learning opportunities, integrated in required, core, elective and executive course work.
• Prepare students to manage and improve supply chain processes to build a competitive advantage through operations.
• Motivate and prepare students for advanced studies in OM
• Support local and state economies with high-quality operations managers who help create value for their employers and establish solid financial foundations with above-average income jobs.

Section IV: Program and Student Assessment

Program Assessment

When students have completed the new major, they should be able to do the following.

- Exhibit strong oral and written communication skills.
- Approach problems using a systematic, analytical thought process.
- Show an understanding of the operations management function, and its relationship to other functional areas within the firm.
- Be familiar with the business vocabulary used within the operations management field.
- Know how to collect and analyze data.
- Simplify complicated situations using mathematical models.

- Have a mental framework whereby the strengths and weaknesses of a firm's operations can be analyzed, and whereby the firm can develop viable alternatives in pursuing its goals and objectives.
- Understand the tradeoffs that managers face in emphasizing one goal (such as high capacity utilization) as compared to another goal (such as minimum throughput time).
- Develop competence with specific tools and techniques used by practicing operations management personnel.
- Compare and contrast the strengths and weaknesses of different strategies and techniques, as determined by industry and global operating environment.
- Understand the impact of variability on processes.

There are several potential mechanisms that we can use to provide the assessment.

- In-class presentations by students to be evaluated by faculty and other students.
- In-class exercises to measure whether students have learned fundamental concepts.
- Case analyses test students' ability to apply concepts.
- Direct surveys and testing of students.
- Certification exams (Certified Project Manager, Certified Quality Manager, etc.)

Expected Standards of Performance

These are the same as those listed in the previous section.

Section V: Finance

Please see the notes below the table for explanation of the numbers in the table. Some of the numbers are specific to the major while many others are for the OIS Department as a whole. Without the explanation, the numbers themselves may not seem consistent.

Financial Analysis Form					
	Year 1	Year 2	Year 3	Year 4	Year 5
Students					
Projected FTE Enrollment	293	305	318	335	345
Cost Per FTE					
Student/Faculty Ratio	1.9	3.1	3.9	5.6	6.7
Projected Headcount	15	25	35	50	60
Projected Tuition					
Gross Tuition	106,000	185,000	272,000	408,000	514,000
Tuition to Program					
5 Year Budget Projection					
	Year 1	Year 2	Year 3	Year 4	Year 5
Expense					
Salaries & Wages	2,153,000	2,348,000	2,418,000	2,631,000	2,710,000
Benefits					
Total Personnel	2,153,000	2,348,000	2,418,000	2,631,000	2,710,000
Current Expense	283,000	250,000	200,000	110,000	115,000
Travel	42000	47000	47000	52000	52000
Capital					
Library Expense					
Total Expense	$2,478,000	$2,645,000	$2,665,000	$2,793,000	$2,877,000
Revenue					
Legislative Appropriation	1,347,000	1,387,000	1,429,000	1,472,000	1,516,000
Grants & Contracts					
Donations					
Reallocation	117,000	117,000	117,000	117,000	117,000
Tuition to Program	1,125,000	1,159,000	1,194,000	1,230,000	1,267,000
Fees					
Total Revenue	$2,589,000	$2,663,000	$2,740,000	$2,819,000	$2,900,000
Difference					
Revenue-Expense	$111,000	$18,000	$75,000	$26,000	$23,000

Budget Comments

As mentioned eariler in the proposal, the OM major will be housed in the OIS Department. Currently the OIS Department already offers a bachelors degree in information systems (IS). The student counts in the tables above are based on only OM classes; most of the dollar amounts, however, are related to the Department as a whole. We felt that separating the money by area (OM and IS) would be somewhat difficult, but may also misrepresent the finances available for the major. To be clear, the revenue and costs of the department are about evenly split between the OM and IS courses and faculty.

The FTE Enrollment numbers are based on total enrollment in classes that we will offer in OM. The majority of these classes are already offered as part of existing undergraduate, MBA and PhD programs. We assumed that a full time student takes 30 hours per year and hence calculated FTE enrollment as annual SCH values divided by 30. Besides growth in the major, we also anticipate growth in masters programs, which will slightly increase FTE enrollment beyond the increase in the number of majors.

The headcount projections are only for students enrolled in the major and hence are much smaller. We have based the gross tuition amounts on these headcount projections. The Office of Budget and Institutiional Analysis shows tuition for a resident student taking 15 hours to be $2507 per semester. It also notes that a $68 per credit hour differential tuition will be assessed for upper division business classes. Hence the annual tuition (for 30 hours) for a resident student is approximately $7050. Using that number and a 5% annual increase in tution, we computed the gross tuition numbers in the table above (we rounded the results to the nearest 1000).

The 5-Year Budget Projection results are for the OIS Department as a whole. We have assumed that state allocation and differential tuition revenue will grow at 3% per year, which we believe is conservative given our assessment of demand for both OM and IS majors, an added MS in IS, and differential tuition allocated to the new department. The reallocation amount includes other moneys received from the Dean's Office and Vice President for endowed chairs, teaching awards, etc.

The Salary and Wages value for year 1 is based on current costs of faculty and staff within the Department. For subsequent years, we have assumed salary increases of 3% per year plus a new hire in each of years 2 and 4. As the University pays us directly for the benefits for state allocated salaries, we have left the benefits portion blank. The David Eccles School of Business does pay benefits on those salaries paid by the differential tuition; however, this amount is deducted from our revenue by the Dean's Office and then transferred to the Senior Vice President. The travel money shown in the table is for faculty research accounts, which are indeed used for travel as well as other research-related activities. Current expenses include typical departmental costs (photocopies, telephone, etc.), but also include some summer research money for faculty that the department pays. The department contribution to summer money is expected to decrease in subsequent years because the School is working on ways to increase summer research money to faculty.

Funding Sources

The program will be funded mainly through state appropriations as well as differential tution. Because we already have OM classes in place, the student credit hours are already in place and have grown over the last few years. The OM major will be part of a department that includes an Information Systems major, which is another source of revenue. As the program grows and students complete their degrees, we also anticipate a small flow of revenue from alumni contributions.

Reallocation

No resources will be reallocated due to the introduction of the new major.

Impact on Existing Budgets

The only impact that we foresee on existing budgets is to the Operations and Information Systems Department as described above.

Appendix A: Program Curriculum

All Program Courses

In the table below, the majority of the core courses represent those required by the DESB. We have used italic font to highlight the courses that will be taught by OM faculty. The table below does not include intellectual exploration, American institution or diversity required courses.

Course Prefix & Number	Title	Credit Hours
Core Courses		
MATH 1090	College Algebra	3
MATH 1100	Quantitative Analysis	3
BUS 1050	Foundations of Business Thought	3
WRTG 2010	Intermediate Writing	3
IS 2010	Computer Essentials	3
ACCTG 2010	Intro to Financial Accounting	3
ACCTG 2020	Intro to Managerial Accounting	3
OIS 2340	*Business Statistics*	3
OIS 3440	*Applications of Business Statistics*	3
ECON 2010	Microeconomics	3
ECON 2020	Macroeconomics	3
COMM 1010 or 1020	Elements of Speech Comm or Public Speaking	3
WRTG 3016	Professional Writing	3
IS 4410	Information Systems	3
FINAN 3040	Financial Management	3
FINAN 3050	Introduction to Investments	3
MGT 3410	Business Law	3
OIS 3660	*Production/Operations Management*	3
MGT 3680	Human Behavior in Organizations	3
MGT 5700	Advanced Management	3
MKTG 3010	Principles of Marketing	3
	International Elective I	3
	International Elective II	3
	Sub-Total	69
Elective Courses	(Students select at least 5 of the following)	

Course Prefix & Number	Title	Credit Hours
OIS 4650	*Principles of Quality Management*	3
OIS 5450	*Simulation of Business Processes*	3
OIS 5610	*Practical Management Science*	3
OIS 5630	*Operations Resource Planning*	3
OIS 5660	Operations Strategy	3
OIS 5670	*Managing Service Operations*	3
	Sub-Total	15
Track/Options (if applicable)		
	Sub-Total	
	Total Number of Credits	84

New Courses to be Added in the Next Five Years

The following courses are currently being planned and will be offered in the next five years. We already offer similar classes at the MBA level. (In fact, the descriptions provided are those for the equivalent MBA classes. These descriptions will change slightly as we design the classes for undergraduate students.)

Prefix & Number	*Title*	*Credit Hours*
OIS 5620	Global Supply Chain Management	3
OIS 5640	Project Management	3
OIS 5650	Six Sigma	3

Descriptions of Proposed Courses

<u>OIS 5620 Global Supply Chain Management</u>

Production of services and goods typically involves many process steps that are spread across multiple firms or departments. In supply chain management (SCM) we examine how to improve performance by considering the actions of multiple members within this chain of activities. SCM addresses not only the flow of materials from upstream to downstream members in the supply chain, but also the flow of information and funds. Advancements in information technology allow the supply chain to achieve performance improvements previously beyond reach, and may change the optimal structure of the supply chain. Class discussion is motivated by case studies that examine successful emerging supply chain strategies.

<u>OIS 5640 Project Management</u>

Project management has become the way of life in many industries. Whether it is development of a new product, organizational-wide implementation of a new IT tool, or execution of a merger, project management skills are required to manage cross-functional teams subject to strict deadlines and tight budget constraints. In this course we discuss all three phases of project management: project conception, execution, and closure. Issues related to project leadership, budgeting, and scheduling will be addressed in the course, and case discussions will highlight state of the art project management practices. Project management software will be introduced (possibly including a group project using MS Project Software).

OIS 5650 Six Sigma

Six Sigma is a philosophy and set of concrete tools designed to reduce variation in all critical processes to achieve continuous and breakthrough improvements that impact the bottom line of organization and increase customer satisfaction. In this course, we will study the five phase DMAIC (Design-Measure-Analyze-Improve-Control) approach in detail with a combination of lecture, small group breakout sessions, and hands-on practice. Course topics will include a review of statistics, process improvement tools, statistical process control, measurement system evaluation, capability analysis and design of experiments. Statistical software such as Minitab will be required and used throughout the class.

Appendix B: Program Schedule

The following is a suggested class schedule—by prefix, number, title, and credit hours.

Course Prefix & Number	Title	Credit Hours
FALL YEAR 1		
PHIL	Philosophy (Humanities) IE Class	3
PSYCH, SOC or ANTHRO	Social Science IE Class	3
MATH 1090	College Algebra	3
	Fine Arts IE Class	3
WRTG 2010	Intermediate Writing	3
SPRING YEAR 1		
MATH 1100	Quantitative Analysis	3
BUS 1050	Foundations of Business Thought	3
IS 2010	Computer Essentials	3
	Science IE Class	3
	American Institutions Course	3
FALL YEAR 2		
ACCTG 2010	Intro to Financial Accounting	3
OIS 2340	*Business Statistics*	3
ECON 2010	Microeconomics	3
COMM 1010 or 1020	Elements of Speech Comm or Public Speaking	3
	Fine Arts IE Class	3
SPRING YEAR 2		
ACCTG 2020	Intro to Managerial Accounting	3
ECON 2020	Macroeconomics	3
OIS 3440	*Applications of Business Statistics*	3
WRTG 3016	Professional Writing	3
	Science IE Class	3
FALL YEAR 3		
	Humanities IE Class	3
FINAN 3040	Financial Management	3
OIS 3660	*Production/Operations Management*	3
	Diversity Requirement Course	3
	International Elective I	3

Course Prefix & Number	Title	Credit Hours
SPRING YEAR 3		
FINAN 3050	Introduction to Investments	3
MGT 3410	Business Law	3
MGT 3680	Human Behavior in Organizations	3
MKTG 3010	Principles of Marketing	3
OIS 5660	*Operations Strategy*	3
FALL YEAR 4		
MGT 5700	Advanced Management	3
IS 4410	Information Systems	3
OIS 5450	*Simulation of Business Processes*	3
OIS 5670	*Managing Service Operations*	3
SPRING YEAR 4		
	International Elective II	3
OIS 4650	*Principles of Quality Management*	3
OIS 5610	*Practical Management Science*	3
OIS 5630	*Operations Resource Planning*	3

Appendix C: Faculty Bios

Krishnan S. Anand is Associate Professor of Operations Management at the David Eccles School of Business (DESB) at the University of Utah. Prior to joining the DESB faculty, he was a faculty member at the Wharton School, University of Pennsylvania, and the Kellogg Graduate School on Management, Northwestern University. Dr. Anand received a B.Tech in Computer Science from the Indian Institute of Technology (IIT) (Madras), an M.S. in Management Science from the Simon School of Business Administration, University of Rochester and his Ph.D. from the Stanford Graduate School of Business, Stanford University, with a concentration in Operations and Information Management.

Dr. Anand's research spans the areas of Operations / Supply Chain Management as well as the economics of Information Systems, and the interface of these two disciplines. His specific interests are in the interplay of Inventories, Information and Incentives in Supply Chains, and in Supply Chain Design and Management informed by these considerations. He also has ongoing research on strategic issues in e-Supply Chains, e-Procurement, Business Process Outsourcing and the optimal design of firms' Information Systems. Dr. Anand has consulted with a variety of firms in the high-tech sector, and serves on the advisory boards of a number of Hi-Tech startups. Prior to his academic career, Dr. Anand worked in the Hi-Tech arena in a variety of positions. He was the co-founder and director of Juggernaut Systems Consultants, a consultancy firm specializing in turnkey software projects, executive training programs, and state-of-the-art systems software.

Tariq Mughal (Lecturer) comes to DESB with fifteen years of experience in the aerospace industry. His experience constitutes in the areas of engineering analysis, project management, business development, finance and program management. While he was at United Airlines in San Francisco he developed a budget of $2.2 Billion dollars for the acquisition and assimilation of U.S. Airways maintenance operations. He has masters in Mechanical Engineering and an MBA from University of Utah. His bachelors are in mathematics with emphasis in statistics. His primary responsibility at DESB is to teach undergraduate statistics classes and manage that program.

Taylor Randall is Dean of the David Eccles School of Business and has served on the faculty of the University of Utah's school of Accounting for the past ten years. As a member of the school's faculty he has been named a George Eccles emerging scholar as an assistant professor and a faculty fellow as an associate professor. He has served as a director for the University Venture Fund since 2003, during which time the Venture Fund has become the largest independent student-run venture in the country at over $18.3 million and has accepted invitations to serve as a visiting faculty member at INSEAD, the Wharton School of Business and Washington University

Randall's research interests focus on economic and performance impact of operational strategies, strategic performance measurement, product variety and supply chain complexity and econometric research in operations management. He is widely published in journals on operations management and marketing. His professional honors include the Brady Superior Teaching Award from the University of Utah and the Wharton Teaching Award. Dean Randall holds a bachelor's with honors in accounting from the University of Utah and an MBA, master's and doctorate in operations and information management from the Wharton School of Business at the University of Pennsylvania.

Glen Schmidt is Associate Professor of Operations Management. His research interests include product innovation, new product development, and supply chain management. He has worked inside and/or

studied firms in various industries including high-tech, heavy-duty equipment, automotive, and oil. Both his research and teaching materials have been recognized for their excellence by the Institute for Operations Research and the Management Sciences (INFORMS).

Jeff Stratman is an Associate Professor of Operations Management. He received his Ph.D. in Business Administration with a concentration in Operations Management from the University of North Carolina at Chapel Hill in 2001. He holds a B.S.E. in Mechanical and Aerospace Engineering from Princeton University. His research interests include operations strategy, the strategic use of information systems for supply chain management, enterprise resource planning (ERP) systems, and management of technology. He has published in Production and Operations Management, the Journal of Operations Management, Decision Sciences, R&D Management and Supply Chain & Logistics Journal, and has presented papers at national meetings of the Institute for Operations Research and the Management Sciences (INFORMS), the Decision Sciences Institute (DSI), and the Production and Operations Management Society (POMS). He is a senior editor for Production and Operations Management, and a member of the editorial review boards of the Journal of Operations Management, and Decisions Sciences. He was a member of the faculty of the College of Management at the Georgia Institute of Technology from 2000-2006. Prior to joining Georgia Tech, he had six years of experience as a manufacturing systems consultant with Andersen Consulting (now Accenture). He is certified in Production and Inventory Management through the American Production and Inventory Control Society (APICS).

Sriram Thirumalai is an Assistant Professor in the Operations and Information Systems Department at the David Eccles School of Business, University of Utah. Sriram holds a Bachelors in Metallurgical Engineering from the Indian Institute of Technology (IIT) Madras, a Master of Science in Statistics from the University of Minnesota, and a Ph.D. in Operations Management from the University of Minnesota. Sriram's research interests are in the areas of Management of Technology, Supply Chain Management, Operations Strategy, and Health Care Operations. Sriram's research has appeared in the Journal of Operations Management and Electronic Markets. He serves a reviewer for various journals including Journal of Operations Management, Production Operations Management Journal, and IEEE Transactions.

Weiyu Tsai is an Associate Professor (Lecturer) of Operations Management. His research interests are in the areas of new product-service development and project management. Specifically, he studies the topics of design of new product-service bundle, new product preannouncement, design competition, and project scheduling and resource allocation. His teaching interests are in the areas of management science and operations management.

Don G. Wardell is Professor and Chair of the Department of Management at the University of Utah's David Eccles School of Business (DESB). He received BS and MS degrees in Metallurgical Engineering from the University of Utah, and a Ph.D. degree from Purdue University's Krannert Graduate School of Management. Dr. Wardell has taught at both the undergraduate and graduate levels, including teaching classes in Spanish at INCAE in Costa Rica. Dr. Wardell was honored with the University of Utah's Distinguished Teaching Award, the DESB's Masters Teaching Excellence Award, the Brady Superior Teaching Award, and the Marvin J. Ashton Award for Excellence in Undergraduate Teaching. His research interests are mainly in the areas of quality management and Six Sigma, and especially statistical process control. He has served as an associate editor for Technometrics, is a member of the

editorial review boards of Production and Operations Management and IIE Transactions on Quality and Reliability and reviews articles for numerous journals.

Appendix D: Sample Industry Job Opportunities

In this appendix is listed information from various job postings on Operations Management. Descriptions of the occupation codes given earlier are also provided.

Zrii: Buyer/Inventory Forecast Analyst

Information
Job ID: 20716
Job Title: Buyer / Inventory Forecast Analyst
Job Reference Num:
Organization Name: Zrii
Referenced Schedule:
Wage/Salary: $37,000 - 40,000
Job Description: SUMMARY
Analyzes sales numbers, monthly demand for sales, and inventory levels to ensure orders are placed to replenish stock. Will use MRP knowledge to cut purchase orders for JIT production. Provides reports to show sales and production data to ensure proper inventory levels.
ESSENTIAL DUTIES AND RESPONSIBILITIES include the following.
Other duties may be assigned.

- Plans and manages production schedules to meet customer delivery requirements and best utilize the company's productive capacity.
- Responsible for the analysis of sales order data with respect to capacity planning and material requirements.
- Responsible for the management of inventory levels, schedules and availability of selected item, either manufactured or purchased, to meet production schedules.
- Complete shipping information and delivery date.
- Receive and review Sales Orders against current requirements
- Release Purchase Orders for production material, packaging, components, raw materials, and finished goods.
- Interface with manufacturing personnel and multiple departments on material status and production planning issues.
- Enter data for quantities of parts issued and transferred between locations, inventory and cycle count adjustments, into computer database.
- Receive and issue finished goods into computer database.
- Troubleshoot quantity discrepancies with manufacturing and inspection personnel.
- Record and monitor all items with shelf-life daily and notify appropriate personnel when material has expired.
- Prepare monthly reports for cycle count and pick-lists count for monthly highlights.
- Prepare and participate in yearly physical inventory.

COMPETENCIES
To perform the job successfully, an individual should demonstrate the following competencies:

- Analytical - Synthesizes complex or diverse information; Collects and researches data; Uses intuition and experience to complement data; Designs work flows and procedures.

- Problem Solving - Identifies and resolves problems in a timely manner; Gathers and analyzes information skillfully; Develops alternative solutions; Works well in group problem solving situations; Uses reason even when dealing with emotional topics.
- Change Management - Develops workable implementation plans; Communicates changes effectively; Builds commitment and overcomes resistance; Prepares and supports those affected by change; Monitors transition and evaluates results.
- Cost Consciousness - Works within approved budget; Develops and implements cost saving measures; Contributes to profits and revenue; Conserves organizational resources.
- Judgment - Displays willingness to make decisions; Exhibits sound and accurate judgment; Supports and explains reasoning for decisions; Includes appropriate people in decision-making process; Makes timely decisions.
- Planning/Organizing - Prioritizes and plans work activities; Uses time efficiently; Plans for additional resources; Sets goals and objectives; Develops realistic action plans.

*Qualifications - IF a degree is required, you MUST include degree level (BS, MS, PhD) and major(s):
QUALIFICATIONS
To perform this job successfully, an individual must be able to perform each essential duty satisfactorily. The requirements listed below are representative of the knowledge, skill, and/or ability required. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.
EDUCATION AND/OR EXPERIENCE
Associates's degree and one to two years related experience and/or training; or equivalent combination of education and experience.
COMPUTER SKILLS
To perform this job successfully, an individual must be computer literate and should have a strong knowledge of Microsoft Excel Spreadsheet software.
JOB KNOWLEDGE, SKILLS AND ABILITIES

- Must possess solid analytical skills in forecasting and anticipating production needs and capabilities.
- Ability to solve practical problems and deal with a variety of changing situations under stress.
- Must be detail oriented and pay close attention to accuracy.
- Ability to properly handle confidential information and records.
- Able to analyze information gathered in order to identify potential problems or discrepancies.

*Application Instructions: Apply by email at jobs@zrii.com
Please put Buyer/Inventory in the subject line, Thanks.
Posting Information
*Job Location(s): Draper, UT
Job Category (Preferred Method):
Business/Finance/Economics
Management
Minimum GPA:
Graduation Start:
Graduation End:
Degrees: Bachelor's
*Majors: ALL MAJORS
*Post Date: 04/04/2008
*Expiration Date: 05/04/2008

Miscellaneous Information
Tuition Reimbursement: No
*Position REQUIRES a degree: No
*Hours: Full-Time

Sharp Analytics: Business Intelligence Analyst

We are a rapidly growing services and technology division of iCrossing, the largest privately-held digital marketing company in the United States. Sharp Analytics is based in Salt Lake City, with analysts in Scottsdale, AZ, Chicago, and New York. We do consulting work, without the extensive travel and instability of normal consulting organizations. If you are looking for variety and fast-paced, interesting work, take a look at Sharp Analytics.

Job Description:

As a member of the Sharp Analytics Business Intelligence practice you will be responsible for systems analysis, design, and implementation of reporting and analytics systems. You will help provide technical support to the sales staff. You will meet with clients to identify project requirements, develop project plans and schedules, write, test and implement software according to the client's specifications. You will be required to interact with people at many levels within an organization, from the CEO to applications developers.

Job Functions:

- Interact with clients to establish applications and systems requirements for assigned projects.
- Create design specifications using current techniques and tools or techniques and tools required by the client.
- Establish timelines for project milestones.
- Develop SQL reports and reporting dashboards per customer specifications.
- Keep current with the latest versions of Business Intelligence software, techniques and practices. Research and develop new ideas in Business Intelligence and Enterprise Reporting strategies.
- Supervise projects and coordinate technical resources as needed within the scope of the project.
- Work within the development team to foster good communication throughout the project life cycle.

Skills needed:

Oracle is the foundation of all of our systems. The candidate should have some knowledge of SQL and relational database concepts. We also look for:

- Ability to deal with complex situations and collaborate effectively with local and remote personnel in order to provide fast and effective problem resolutions.
- Superior communication skills.
- Ability to work in a fast-paced environment.
- Must be team-oriented, possess excellent organizational and written skills, and demonstrate the ability to communicate with either a software developer or business audience.

Education and Experience Required:
The candidate should have (or be close to completing) a Bachelors or Masters degree in either Information Systems, Business Administration, Accounting or Statistics. He or she should also have 3+ years of proven success developing analysis or reports to answer strategic business questions.

Description of Occupation Codes Related to Operations Management

11-1021 General and Operations Managers

Plan, direct, or coordinate the operations of companies or public and private sector organizations. Duties and responsibilities include formulating policies, managing daily operations, and planning the use of materials and human resources, but are too diverse and general in nature to be classified in any one functional area of management or administration, such as personnel, purchasing, or administrative services. Include owners and managers who head small business establishments whose duties are primarily managerial. Exclude "First-Line Supervisors/Managers of Retail Sales Workers" (41-1011) and workers in other small establishments.

11-3051 Industrial Production Managers

Plan, direct, or coordinate the work activities and resources necessary for manufacturing products in accordance with cost, quality, and quantity specifications.

11-3061 Purchasing Managers

Plan, direct, or coordinate the activities of buyers, purchasing officers, and related workers involved in purchasing materials, products, and services. Include wholesale or retail trade merchandising managers and procurement managers.

11-3071 Transportation, Storage, and Distribution Managers

Plan, direct, or coordinate transportation, storage, or distribution activities in accordance with governmental policies and regulations. Include logistics managers.

11-9111 Medical and Health Services Managers

Plan, direct, or coordinate medicine and health services in hospitals, clinics, managed care organizations, public health agencies, or similar organizations.

13-1081 Logisticians

Analyze and coordinate the logistical functions of a firm or organization. Responsible for the entire life cycle of a product, including acquisition, distribution, internal allocation, delivery, and final disposal of resources.

15-2031 Operations Research Analysts

Formulate and apply mathematical modeling and other optimizing methods using a computer to develop and interpret information that assists management with decision making, policy formulation, or other managerial functions. May develop related software, service, or products. Frequently concentrates on collecting and analyzing data and developing decision support software. May develop and supply optimal time, cost, or logistics networks for program evaluation, review, or implementation.

15-2041 Statisticians

Engage in the development of mathematical theory or apply statistical theory and methods to collect, organize, interpret, and summarize numerical data to provide usable information. May specialize in fields, such as bio-statistics, agricultural statistics, business statistics, economic statistics, or other fields. Include mathematical statisticians.