Analysis of UMHS Ortho Operating Room Turnaround Time
University of Michigan Program & Operations Analysis Proposal

For:

Janine Robinson, RN
OR Core B Manager, UH

Diana Pierce
Clinic Nurse III UMHS OR

Kevin Tremper
Chair of Department of Anesthesiology

Shawn Murphy
Director of Nursing

Shon Dwyer
Associate Director of Operations & Ancillary Services

Mandy McKay
Management Engineer Fellow

Mary Duck
Sr. Management Engineer

Submitted by:

Rishabh Chadha, Analyst
Sharon Deshpande, Analyst
Devan Gandhi, Analyst
Jonathan Sherman, Analyst

Date Submitted: February 11th, 2008
# Table of Contents

Introduction................................................................................................................................................... 3  
Background and Current Process.................................................................................................................. 3  
  Current Patient Turnaround Process ......................................................................................................... 4  
  Key Issues ................................................................................................................................................. 5  
Goals and Objectives .................................................................................................................................. 5  
Project Scope ............................................................................................................................................... 6  
Proposed Approach....................................................................................................................................... 6  
  Perform Literature Search and Analyze Historical Data........................................................................... 6  
  Collect Data On-Site ................................................................................................................................. 6  
    Examine Current OR Layout and Processes ......................................................................................... 6  
    Time Studies ......................................................................................................................................... 6  
    Instrument Trays ................................................................................................................................... 7  
    Timeouts ............................................................................................................................................... 7  
    Interview Key Personnel....................................................................................................................... 7  
  Analyze Collected Data ............................................................................................................................ 7  
Schedule........................................................................................................................................................ 7  
Deliverables .................................................................................................................................................. 8  
Expected Outcomes ...................................................................................................................................... 8  
Project Team ............................................................................................................................................. 8  
  Project Client/Manager ............................................................................................................................. 8  
  Project Coordinators ................................................................................................................................ 8  
  Project Team ............................................................................................................................................. 8  
APPROVAL .................................................................................................................................................. 9  
APPENDIX A: Current Turnaround Process Flowchart ............................................................................ 10  
APPENDIX B: Gantt Chart ........................................................................................................................ 11  
APPENDIX C: Resumes............................................................................................................................. 12
Introduction

The University of Michigan Health System (UMHS) is a large health facility with several departments and clinics around the University of Michigan and the city of Ann Arbor. Our clients, Janine Robinson, the Operating Room (OR) Core B Manager, and Diana Pierce, Clinic Nurse III of the UMHS OR department, have expressed concerns regarding the long turnaround times\(^1\) and the non-standardized timeout\(^2\) procedures of their Orthopedic Trauma and Joint Surgical teams.

The project team will observe and collect data for the current processes associated with turnaround and turnover\(^3\) time during orthopedic trauma and joint surgeries. The collected data will be compared to data supplied to the team by the Operating Room Management Information System (ORMIS) to ensure the validity. The team will also carry out time studies on the current turnaround process and interview employees that are involved. Finally, the team will compile a final report that will provide a list of recommendations to improve the turnaround processes and future state map.

The recommendations will be aimed to help the OR achieve the three primary goals of the project. The first goal is to reduce the average turnaround and turnover time. This goal can be achieved through reducing the variability in the processes between surgeries. Our second primary goal is to reduce instrument tray inefficiencies. Our last primary goal is to standardize the ‘timeout’ process. The future state map will address these goals by standardizing the instrumentation process, clarifying and re-organizing the tasks of OR staff. The recommendations will also help achieve the goals by ensuring the timeliness of surgeries and decreasing staff wait times.

This proposal outlines the scope of the project, the timeline of the tasks, the techniques used for collecting and analyzing data along with the items to be delivered to our client.

Background and Current Process

The team of individuals that participate in the surgery and the turnaround process include:

- Circulating Nurse (Circulator)
- Scrub Nurse
- Resident Nurse (RN)
- Perioperative Technician (PT)

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1 Defined as the time between the dressing end of a patient to the first incision of the next patient. Dressing is the procedure of closing, cleaning and bandaging a patient’s incision after surgery.

2 Defined as the time when the head surgeon asks the entire team to stop and confirm the details of the surgery before proceeding. Usually occurs twice in any surgery.

3 Defined as the time between wheeling out a patient after surgery to wheeling in next patient. The turnover process is part of the turnaround process.
• Attending Anesthesiologist
• Medical Resident (Anesthesia)
• Certified Registered Nurse Anesthesia (CRNA)
• Attending Surgeon
• Medical Fellow/ Resident/Student (Surgery)
• Patient
• Other support personnel

Current Patient Turnaround Process
After the initial observation session of the current turnaround process, the team identified and documented the steps that compose the turnaround process. These steps are non-standardized, therefore the order of these steps may vary. (A visual representation of the current process is attached to Appendix A):

(1) Dressing end
(2) Anesthesia breakdown (remove and clean anesthesia instruments and machines)
(3) Account for surgical instruments/sponges
(4) Extubate patient (remove tube)
(5) Wake up patient and confirm that the patient is stable
(6) Complete relevant paperwork and compile files
(7) Enter information on the completed surgery into ORMIS
(8) Retrieve information on the upcoming surgery from ORMIS
(9) Call for PT’s to clean room and call for next patient
(10) Wheel patient out of OR
(11) Restock supplies
(12) PT’s enter OR
(13) Clean OR and various other machines
(14) Arrival of Scrub nurse with bipod (instruments and drapes)
(15) Set up tools and machines for next surgery
(16) Lay out tools in sterile field
(17) Open sterile tool packages and count tools
(18) Dress and prepare surgeon/s
(19) PT’s leave OR
(20) Wheel in ‘new’ patient
(21) First timeout with patient awake (identify name/birthdate/procedure)
(22) Position patient on surgical bed
(23) Perform induction (administer anesthesia)
(24) Intubate patient (put tube into patient)
(25) Perform foley processes
(26) Scrub, clean, dress and prepare patient
(27) Second timeout (agree on all aspects of surgery/procedures/patient condition)
(28) Sterilize patient's skin around incision point
(29) Mark incision lines
(30) Perform initial incision
Key Issues
After preliminary observations, the team identified five key issues.

High Turnaround and Turnover Times
The average turnaround and turnaround times are too high. A high variability within the processes during the turnaround time is a possible root cause of this issue.

Instrument Tray Inefficiencies
Prior to the surgery, specific instrument trays will be requested. However, there are also instrument trays being requested during surgery. It is an inefficient use the OR staff’s time if the trays requested during surgery go unused.

Non Standardized Timeouts
Timeouts before surgery are not following a standardized process. The frequency and duration of the timeouts are different from surgery to surgery. The level of involvement of the staff and patients are also not consistent.

Staff Timeliness
Surgeries can be held up if the staff members involved with the surgeries do not arrive at the OR at the same time. This can lead the delays in the surgery times.

Overall Inefficiencies
Other inefficiencies in the tasks that are done in the OR between closure and cut may attribute the turnaround and turnover times.

Goals and Objectives
To address the key issues, the team has defined primary and secondary goals. The primary goals are:

- Reduce Turnaround time
- Reduce Turnover time
- Reduce instrument tray inefficiencies
- Standardize timeouts

The secondary goals are:

- Determine what affects turnaround time during surgery
- Determine what affects turnaround time before/after surgery
- Standardize processes to reduce human error
- Minimize or eliminate wait times inside OR
- Improve patient and staff satisfaction
Project Scope

This project will assess turnaround time, turnover time, intra-operative instrument tray requests, timeouts and other process inefficiencies, such as sub-optimal workflow, within the Orthopedic Trauma and Joint OR in the UMHS. This project will not include anything within other surgical or medical branches of UMHS. Instrument sterilization, packaging, and inventory analysis will not be covered within this project scope. No analyses will be conducted regarding actual surgeries or pre-operative procedures, and no cost analysis will be performed.

Proposed Approach

To reduce OR turnaround and turnover time, analyze Timeouts, and reduce instrument tray inefficiencies, the team will collect qualitative and quantitative data. The methodology involved is as follows.

Perform Literature Search and Analyze Historical Data
The team will conduct a literature search to gain a background in the processes involved in the turnaround process. The team will use this information to understand the concerns and impacts related to long turnaround times, and study the successes and failures of different approaches to reduce turnaround time implemented by other healthcare facilities. Time studies of past surgeries will be provided by the Team Coordinator through the Operating Room Medical Information System (ORMIS). These studies will provide data regarding turnaround times. The team will use this data to identify areas of inefficiency, which can be used as areas of focus during On-Site data collection.

Collect Data On-Site
The team will be on site collecting data in the OR. While in the OR, the team will remain uninvolved in any processes occurring in the OR and will not interfere with the operation.

Examine Current OR Layout and Processes
In order to document and analyze the current OR layout and processes, the team will perform the following tasks.

- Observe and document turnaround process
- Create a detailed current-state map of the OR
- Identify personnel involved in the turnaround process, noting which tasks they are responsible for
- Determine duration of individual tasks
- Observe and document processes involved with fulfilling mid-surgery instrument requests
- Note personnel downtime

Time Studies
The team will perform time studies, noting the exact times that all turnaround sub-processes start and finish. The staff involved with each task will be noted as well. As a part of the time studies, the team will prepare data collection forms and train the staff about the collection process.
Instrument Trays
During the surgeries, the team will note how many tray requests occur mid-surgery, as well as how long

The team will collect the following data relating to instrument trays.

- How much advance notice was given to fulfill requests, and how they were requested
- Number of trays were requested during the surgery
- How much time was spent by staff to fulfill these requests
- How many instrument trays were used out of those requested during surgery

Timeouts
All Timeouts will be observed. The duration, as well as the involvement of the personnel and the patient will be noted.

Interview Key Personnel
The team will need to interview key staff members who are involved in the turnaround process, including the Chair of the Department of Anesthesiology Dr. Kevin Tremper, the OR Core B Manager and client Janine Robinson, and Clinic Nurse III Diana Pierce. Other nurses, residents, anesthesiologists, circulators, surgeons, peri-operative technicians, and cleaning staff will also be interviewed. Patients will not be interviewed. Current perceptions and ideas for improvement will be noted, as well as a detailed description of the turnaround process.

Analyze Collected Data
The team will analyze all data collected on-site, as well as through ORMIS, regarding turnaround time, timeouts, and instrument tray requests and usages. The team will pay specific attention to finding the root cause of delays in turnaround time. The team will then prepare detailed recommendations regarding the turnaround process, including a future state map of the OR, and the results of Timeout and Instrument Tray request analysis.

Schedule
To submit a final report by April 14, 2008, the team will perform the following tasks according to the timeline provided below. For further details, please see the Gantt Chart provided in Appendix A.

- Perform Literature Search and Historical Data Collection 2/4/08 – 2/22/08
- Perform On-Site Data Collection 2/12/08 – 3/15/08
- Analyze Data 2/19/08 – 4/5/08
- Deliver Interim report presentation 3/3/08
- Deliver Final report and presentation 4/14/08
- Deliver Final report presentation to client 4/16/08

To meet these due dates, the team will use Wks 1-3 for preparation. The team project’s that their Operating Room data collection will begin Wk 4 and will be complete by Wk 9. This data
collection includes time studies conducting in the Operating Room, and staff interviews. This data will be collected from the week of February 3, 2008 until the week of March 2, 2008.

**Deliverables**

The University Hospital will receive the following items to help in minimizing the turnaround time in the Orthopedic Trauma and Joint Operating Rooms, increasing the effectiveness of time-outs and increasing the efficiency of instrumentation.

- Current state map
- Future state map
- Data table with times of tasks in OR from closure to cut
- Data table with instrument tray usage
- Interim report and presentation
- Final report and presentation
- Recommendations for change

**Expected Outcomes**

Upon completion of the project, the recommendations will result in the following outcomes.

- Decreased turnaround time
- Decreased requested and unused instrument trays during surgeries
- Standardized time-outs between surgeries
- Optimized personnel utilization
- Improved process of instrument requests
- Increased volume of surgeries that OR can handle
- Increased staff and patient satisfaction

**Project Team**

The following key members will work closely throughout this project.

**Project Client/Manager**
Janine Robinson, RN: Operating Room Core B Manager, UMHS-1C206K

**Project Coordinators**
Mandy McKay, P&OA Management Engineer Fellow
Mary Duck, Sr. Management Engineer

**Project Team**
Rishabh Chadha, see attached resume
Sharon Deshpande, see attached resume
Devan Gandhi, see attached resume
Jon Sherman, see attached resume
APPROVAL

Approved by:

Janine Robinson, Operating Room Core B Manager

Diana Pierce, Clinic Nurse III UMHS OR

Mary Goulet Duck, UMHS Program & Operations Analysis

Mandy McKay, UMHS P&OA Engineering Fellow

Rishabh Chadha, Associate, UMHS P&OA

Sharon Deshpande, Associate, UMHS P&OA

Devan Gandhi, Associate, UMHS P&OA

Jonathan Sherman, Associate, UMHS P&OA
APPENDIX A: Current Process Flowchart

'This is a broad version of the process and can vary between surgeries
**APPENDIX B: Gantt Chart**

### Task Gantt Chart

<table>
<thead>
<tr>
<th>Task</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
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<tbody>
<tr>
<td>Client Meetings</td>
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<tr>
<td>Coordinator Meetings</td>
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<tr>
<td>Team Meetings</td>
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<tr>
<td>Project Orientation</td>
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<tr>
<td>Proposal</td>
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<tr>
<td>Prepare Draft Proposal and Presentation</td>
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<tr>
<td>Review and Revise Proposal</td>
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<tr>
<td>Data Collection Forms</td>
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<tr>
<td>Train Staff about Collection</td>
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<tr>
<td>Perform Literature Search</td>
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<tr>
<td>Collect Historical Data</td>
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<td></td>
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<td></td>
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<tr>
<td>Examine Current OR Layout and Processes</td>
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<tr>
<td>Interview Key Staff Members</td>
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<tr>
<td>Perform Time Studies</td>
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<tr>
<td>Data Analysis</td>
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<tr>
<td>Draft Interim Report</td>
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<tr>
<td>Revise Interim Report</td>
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<tr>
<td>Final Report</td>
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<tr>
<td>Prepare Draft Final Report and Presentation</td>
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<tr>
<td>Revise Final Report and Presentation</td>
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</tbody>
</table>

### Total Person Hours

- Week of Jan 25 - Break for Spring Vacation
- Week of Feb 25 - Break for Spring Vacation

<table>
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<th>Week</th>
<th>Total Person Hours</th>
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<td>1</td>
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<tr>
<td>2</td>
<td>153</td>
</tr>
<tr>
<td>3</td>
<td>153</td>
</tr>
<tr>
<td>4</td>
<td>153</td>
</tr>
</tbody>
</table>

*Note: Person Hours are rounded to the nearest hour.*
APPENDIX C: Resumes
Rishabh Rajnish Chadha

734-834-6465
rishabhrc@umich.edu

University of Michigan
Ann Arbor, MI, Dec 2008

Education:
B.S.E. Industrial and Operations Engineering / Economics (Dual), Recent G.P.A: 3.1/4
Courses: Derivative Instruments, Financial Economics, Simulation, Decision Analysis, Principles of Accounting, Intermediate Micro/Macro Economic Theory, Product and Inventory Control, Manufacturing/Lean Production, Entrepreneurship

Experience:
Michigan Engineering Consulting Club
Ann Arbor, MI, 01/08 – Present
President
• Responsible for managing the organization and creating an active medium between the students and the consulting industry by providing events and workshops that are beneficial to the aspiring consultant at the College of Engineering.
• Delegating tasks to the Vice-Presidents and the Professional Development Chair to assure the successful completion of all workshops, maintenance of contacts/resources and a progressive growth of the organization.

National Association of Engineering Student Councils
Ann Arbor, MI, 10/07 – Present
Vice-President of Finance (Midwest Region)
• Responsible for preparing a projected budget for the following fiscal year, along with biennial financial statements and presenting them to the Voting Delegates at the national conference.
• Keeping accurate records of all monies in the NAESC, Inc. Midwest Region accounts and NAESC, Inc. Midwest Region properties, by maintaining contact with accountants to ensure accurate records.

University of Michigan Engineering Council
Ann Arbor, MI, 11/06 – 12/07
Director of Finance
• Managed UMEC resources and allocated funds to all the different engineering societies and their treasurers.
• Reviewed and monitored all UMEC financial matters and compiled accurate reports on all transactions that took place every term, while handling UMEC account portfolios worth $60,000.
• Increased society funding from $12,000 to $22,000 for the first time in UMEC history.

ORACLE
Dubai, U.A.E, 08/06 – 09/06
Intern/Trainee
• Consulted several established businesses in Middle East and Africa to determine which Oracle E-Business products would best suit and enhance their current and future IT related operations, and played an integral part in selling these products to clients.

KPMG
Dubai, U.A.E, 06/06 – 08/06
Intern/Trainee
• Researched different types of Infrastructure financing being used around the globe, and presented a report on how to implement these methods in the city of Dubai.

University of Michigan - Peer-Mentor Engineering for the Community
Ann Arbor, MI 01/04 – 05/04
• Selected from 200 students as one of 15 to assist an engineering professor in a special work-study community based project.
• Designed and built greenhouses for school children in less fortunate areas of Ypsilanti, Michigan, and collected donations for building costs. The greenhouses also served an economic purpose as they gave the children the opportunity to grow their own food for lunch, saving both the school and the children money.
• Presented project at 3rd Annual Symposium on Community-Based Work in Michigan (One of three selected)
• Carried out lumber inventory and worked with FINGERLE LUMBER to write detailed instructions on how to construct medium-sized greenhouse at very low costs (under $1000 per greenhouse).

CONVRGNT Value Engineering L.L.C (reputed large scale engineering firm)
Dubai, U.A.E, 06/03 - 08/03
Intern/Trainee
• Identified opportunities for process improvements and wrote two detailed reports on how to optimize their shot-blasting and welding processes. Suggested economic and ergonomic changes were implemented by the company immediately, greatly improving the work flow and productivity while reducing costs.

Leadership Activities:
• Princeton Review – Prep Test Instructor 04/07 – Present
• University of Michigan Office of Student Conflict Resolution – Student Panelist 01/07 – Present
• University of Michigan Graduation Committee – Events Chair 11/06 – 05/07
• University of Michigan International Center Advisory Board – Student Advisor 09/05 – 05/06

Computer Skills:
• Applications: Visual Basic, Maple, Matlab, MS Office
• Languages: C++, HTML

Languages: Fluent in English and Hindi. Basic understanding of French.
Devan Gandhi

731 Packard, Ann Arbor, MI 48109
dogandhi@umich.edu

Education:

University of Michigan - Ann Arbor, MI 9/02 - Current
  • Bachelors in Industrial Operational Engineering, expected completion April 2008

University of California - Irvine, CA 6/04 - 9/04
  • Computer Programming in Java and C++ and Jazz history

Work Experience:

E-Works Inc. – National Market Research firm Irvine and Long Beach, CA 6/04 - 9/04
  • Assisted launch of Irvine Branch directly under Southern California Manager
  • Worked as field researcher, for firm directly contracted by Nielsen, MGM, Sony, Warner Brothers, Disney, and other major motion picture companies
  • Performed 150-250 interviews per week

Med-Share, Inc. – Medical Mobile Diagnostics firm Southfield, MI 6/03 - 6/04, 6/97 - 8/00
  • Coordinated Corporate Cell Phone Account between provider and employees
  • Worked as Biller, calling Delinquent Accounts
  • Received Executive and Managerial Training from President
  • Worked in IT department Computer Help Desk and as Administrative Assistant

CHUM Group – Canadian Media Corporation Bingham, MI 2002
  • Worked as Promotions Assistant in the Detroit offices for CHUM radio stations
  • Worked directly under Promotions Director
  • Learned Sales and Promotions operations at street level as well as corporate level

Extra Curricular Activities:

Cut to Scene – Seven Piece Music Group Ann Arbor, MI 2006 - Present
  • Founded and lead a live and recorded independent rock group
  • Act as composer, songwriter, lead singer, guitarist, bassist, and manager
  • Soon to be featured on multiple television programs, and soon to tour the mid-west, and record and release a new album

WUMD – Internet Radio Station for University of Michigan Dearborn, MI 1/03 - 6/03
  • Wrote and produced own 3 hour weekly radio show broadcast locally and over the internet
  • Assisted in several radio promotion events on and off campus
  • Trained in how to run studio equipment
  • Wrote reviews for 5 new cds a week

Relevant Skills:

  • Possess Strong Verbal and Written Communication, Leadership and Problem Solving Skills
  • Highly motivated and comfortable in both team and individual settings
  • Proficient in both Windows and Mac environments with MS Office - Word, Excel, PowerPoint, Outlook, Publisher, strong internet research skills, can program in Visual Basic, Java, C++
Sharon Deshpande  
5190 Blue Spruce Drive  
Ypsilanti, MI 48197  
Cell Phone: (734) 330-3109  
Email: sndeshpa@umich.edu

OBJECTIVE: I am seeking a challenging position in Finance that will let me allow me to use my extensive skills, while also allowing a chance for growth.

EXPERIENCE

Soft-Link International Inc., Ann Arbor, MI January 2006 – Current
Accountant

- Extensive use of QuickBooks professional version to create invoices, receive payments, create checks, enter bills, pay bills, and keep accounts balanced.
- Reconcile bank statements by downloading online bank statements
- Reconcile inter company transaction between Soft-Link and international vendors
- Use of "items" to track item profitability
- Track credit card statement breakup
- Process online bill pay
- Use of ADP to give input for payroll processing of 1099 and W2 employees on monthly and bi-weekly basis
- Enter payroll entries in QuickBooks
- Enter journal entries for payroll taxes
- Generate A/R, A/P reports, company statements i.e. P&L, B/S on monthly basis

Toyota Technical Center Human Resources, Ann Arbor, MI September 2003 – June 2004
Office Assistant

- Use of Microsoft Office such as Word and Excel to process documents, print, copy, file, organize and report status.
- Use of DreamWeaver to update the website, along with designing a webpage.
- Help in office administration.

MathSmart, Ann Arbor, MI August 2003 – October 2003
Co-Founder, Accountant, Teacher

- Formed the program by advertising around Ann Arbor, MI to various different middle schools targeting students averaging 13 years of age.
- Created a fast paced 12 week program consisting of algebra, geometry, fractions, and word problems, focusing on each thoroughly for three weeks.
- Manage accounting by keeping track of payments, and by calculating taxes for the government.
- Designing a schedule for class, along with interactive games for the students.
- Tutored the students on extra help on homework.

EDUCATION

University of Michigan, Ann Arbor September 2004 – May 2008

- B.S. in Industrial and Operations Engineering Cumulative GPA: 3.2/4.0

- Taken Courses In:
  - Corporate Finance
  - Accounting Principles
  - Principle Economics I & II
  - Money and Banking
  - Economic Decision Making
  - Linear Statistical Models

COMPUTER SKILLS

I have comprehensive experience with QuickBooks, Microsoft Word, Excel and PowerPoint, along with simulation programs such as ProModel and GPSS/H. I have also completed a few computer courses including Computer Applications, Visual Basic 6.0, and Business Applications.

REFERENCES

Available upon request.
Jonathan A. Sherman
1027 E. University #2 • Ann Arbor, MI 48104
jonshern@umich.edu • 734 255 9924

EDUCATION
UNIVERSITY OF MICHIGAN
College of Engineering
Bachelor of Science in Engineering, Graduation April 2008
Major: Industrial and Operations Engineering
Relevant Courses: Corporate Finance, Derivative Instruments, Accounting
• GPA: 3.2/4.0
• Member of Wolverine Investment Club
• Sigma Alpha Mu Fraternity Candidate Educator and Athletic Chair

College of Literature, Science, and Arts
Minor: Hebrew and Judaic Cultural Studies
• SAT: 800 Math, 630 Verbal

EXPERIENCE
SMITH BARNEY – CORPORATE CLIENT GROUP
Finance Intern
New York, NY
2006 (Summer)
• Performed revenue analysis outlining cash flows in excess of $1B for over 200 Corporate
  Client Group accounts
• Updated network database for Reinvestment Group with financial information for 1,000+
  potential clients
• Developed interactive instructional presentations used by all Smith Barney Financial
  Advisors on new system enhancements
• Compiled directory of employees from over 600 corporate stock plan clients

PERKINS & WILL
Architecture Intern
Minneapolis, MN
2003 (Summer)
• Built and constructed to-scale models of various projects ranging from university lecture
  halls to buildings in a downtown setting
• Observed on-site construction projects and dealings between contractors and architects
• Blueprint management

CAMP TEL YEHUDA
Assistant Chef
Barryville, NY
2005 (Summer)
• Cooked and prepared 3 meals a day for over 600 campers and staff member
• Thoroughly cleaned facilities on a daily basis
• Helped kitchen staff cater to the dietary needs of the camp’s staff and campers

AYALIM ELEMENTARY SCHOOL
Class Assistant
Tiberias, Israel
2003-2004
• Taught English to 5th and 6th grade students, including many Ethiopian and Russian
  immigrants
• Provided one-on-one English language tutoring for struggling students
• Offered guidance and support to a group of over 25 elementary school students

ADDITIONAL
• Proficient in C++, C, Visual Basic and Microsoft Office
• Participated in community service with Michigan Hillel at Glacier Hills Nursing Home
• Volunteer firefighter with the Haifa Fire Department in Haifa, Israel
• National Merit Scholarship Honorable Mention
• Advanced Placement Scholar with Distinction
• Fluent in Hebrew language
• Sufficient knowledge of Spanish language
• Travelled to 19 different countries in 4 different continents