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<http://www.engr.uvic.ca/~seng321/>  
<https://courses1.csc.uvic.ca/courses/201/spring/seng/321>


## Announcements

- Website up and running
- Slides from the first lecture posted
- Next topics
  - Quality attributes
  - Software life cycles
- Tuesday
  - RFP presentations
  - Project selection
- Thursday
  - Team selection
- Reading Assignment
  - Chapters 1-3 Elicitation
  - Chapters 8-10 Elicitation and Modelling

## Evaluation

3 Quizzes	6%
Participation	5%
Midterm exam	14%
Group Project	40%
Final exam	35%

- Remarks
  - Midterm is in-class; final is scheduled by UVic
  - You **have** to pass the project and the final exams to pass the course



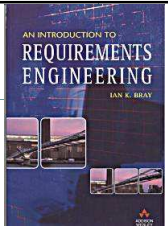

## Text Books

**Required Textbook**

- Ian K. Bray: An Introduction to Requirements Engineering, Pearson (2002)

**Recommended Textbook**

- P. Bourque, R. Fairley: SWEBOK V3.0: Guide to the Software Engineering Body of Knowledge, IEEE Computer Society (2014)

<http://www.engr.uvic.ca/~seng321/resources.html>

## SENG 321 Calendar

First day of classes	Tue, Jan 5
Labs begin	Tue, Jan 12
Reading break	Feb 8-12
Midterm	Fri, Feb 23
Easter break	Mar 25-28
Project presentations	Mar 29-31
Last day of classes	Fri, Mar 31

Detailed course calendar: deliverables deadlines  
<http://www.engr.uvic.ca/~seng321/calendar.html>

**Students must participate in all project presentations in class & labs**  
**No show results in a 25% reduction in the mark for that presentation**

## Project Deadlines and Marks

1. Call for Project Proposals		6 Jan (Class)
2. Request for Proposal (RFP)		8 Jan
3. Project selection		12 Jan (Lab)
4. Team selection		14 Jan (Lab)
5. Informal Requirements Definition (S0)	5%	21 Jan (Lab)
6. Project website up and running (S0)	5%	21 Jan (Lab)
7. Customer Feedback on S0 (C0)	5%	26 Jan (Lab)
8. Formal Requirements Spec (S1)	10%	16 Feb (Lab)
9. Customer Feedback on S1 (C1)	5%	18 Feb (Lab)
10. Detailed Requirements Spec (S2a)	10%	1 Mar (Lab)
11. Prototype demo (S2b)	5%	3 Mar (Lab)
12. Customer Feedback on S2a-b (C2)	5%	8 Mar (Lab)
13. Final Requirements Spec (S3a)	15%	15 Mar (Lab)
14. User Manual (S3b)	10%	22 Mar (Lab)
15. Customer Feedback on S3a-b (C3)	5%	24 Mar (Lab)
16. Demo Final Project (S4)	10%	29,31 Mar (Lab)
17. Customer Feedback on S4 (C4)	5%	29,31 Mar (Lab)
18. Instructor and TA Evaluations (S5)	5%	1 Apr

## Next Week

**Tuesday**

- Project selection
- 80 proposals
- 2 mins elevator speech per student
- Select 19-20 projects
- Lecture and lab
- ELL 167

**Thursday**

- Team selection
- 80 students
- Select 19-20 well balanced teams of 4 students
- Lab ELL 167

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## Request for Proposal (RFP)

- Submit three documents
  - Your RFP — use 2016 SENG 321 RFP template
  - Your 1-page PDF slide for 2-mins elevator speech
  - Your 1-page résumé documenting your experience
- This assignment counts as class participation
- Due date Fri, Jan 8 — 1:00 pm
- Submit to [submit@rigiresearch.com](mailto:submit@rigiresearch.com)

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## Deliverable 1a RFP Template

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## Deliverable 1a Statement of Work Template

- I. **Scope of Work:** Describe the work to be done to detail. Specify the hardware and software involved and the exact nature of the work.
- II. **Location of Work:** Describe where the work must be performed. Specify the location of hardware and software and where the people must perform the work
- III. **Period of Performance:** Specify when the work is expected to start and end, working hours, number of hours that can be billed per week, where the work must be performed, and related schedule information.
- IV. **Deliverables Schedule:** List specific deliverables, describe them in detail, and specify when they are due.
- V. **Applicable Standards:** Specify any company or industry-specific standards that are relevant to performing the work.
- VI. **Acceptance Criteria:** Describe how the buyer organization will determine if the work is acceptable.
- VII. **Special Requirements:** Specify any special requirements such as hardware or software certifications, minimum degree or experience level of personnel, travel requirements, and so on.

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## Deliverable 1a Many Web Resources on RFPs


- How to respond to an RFP  
<http://www.slideshare.net/MarianneKolodiy/how-to-respondtorfp>
- How to write an RFP for web content management  
<http://www.slideshare.net/Percussion/how-to-write-a-request-for-proposal-rfp-for-web-content-management>

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## Deliverable 1b

### 1-page PDF Project Summary

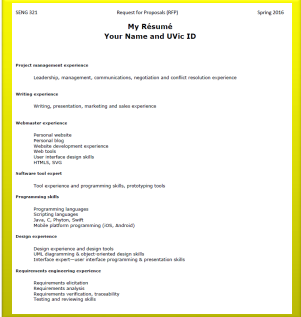
- 1-page PowerPoint slide to sell your project to the entire class (PDF format)
- On Tuesday
  - 2 mins elevator speech per student
  - Select 20 projects from 80 submissions by voting for projects




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## Deliverable 1c

### Your Résumé for Team Building




The resume is required for balanced group assignments



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## Project Ideas




- Smart system
  - Context-aware
  - Self-adaptive
  - Mobile
- Example past projects
  - Web based sprinkler system
  - Food management system
  - Parking meter system
  - Travel management system
  - Inventory control system
  - Auction system
  - Smart home
  - Wardrobe advisor
  - Bus tracking system

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## Websites


- Each group will maintain a simple website with two components throughout the term:
  - Customer website
  - Developer website
- Website should be up by **21 Jan 2016**
  - Worth 5% of your project mark
  - If not kept up-to-date throughout the term, the entire team loses the 5%



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## Peer Reviews

- We expect all team members to receive the same marks for the project deliverables
- Customer reviews are required after each major deliverable
- Your mark and your team members' marks depends on the reviews being sent in on time!




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## Lateness Policy for All Course Deliverables

- All deliverables to be emailed to the course account to [submit@rigiresearch.com](mailto:submit@rigiresearch.com)

NO LATE DELIVERABLES!!



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## Academic Integrity and Cheating

- Cheating, plagiarism and other forms of academic fraud are taken very seriously by the University, the Faculty, and the teaching staff.
- Examples:
  - Submitting the work of another person as your original work
  - Incorporating others work in your work and not attributing it
  - It is permitted and encouraged to discuss projects with your peers on the whiteboard but **NOT** permitted to copy their solutions as they talk to you. Both parties would be penalized
  - All sources must be properly cited including websites
- Consult UVic's policy on academic integrity:
  - <http://web.uvic.ca/calendar2009/FACS/UnIn/UARe/PoAcI.html>

## Requirements Engineering Many Forces at Work

## Separation of Concerns

## Why Requirements Engineering?

## Why Requirements Engineering?

- Good requirements leads to higher quality software
- Problem
  - Everybody is for it—under certain conditions.
  - Everybody feels they understand it—even though they wouldn't want to explain it.
  - Most people feel that problems in these areas are caused by other people—if only they would take the time to do things right.

*Roger Pressman quoting Philip Crosby*

## What is Quality (Pressman)?

- Conformance to explicitly stated requirements, standards, and implicit characteristics
- Functional and non-functional **requirements**
  - Foundation from which quality is measured
  - Lack of conformance  $\leftarrow \rightarrow$  lack of quality
- Explicitly documented development **standards**
  - Development criteria guide manner software engineered
  - Criteria not followed  $\rightarrow$  lack of quality
- Implicit characteristics expected of professionally developed software
  - Often go unmentioned (e.g., desire for good maintainability)
  - Even if explicit requirements met, failing to meet implicit requirements suggest suspect software quality

## Quality Factors

- **Correctness:** fulfill specifications
- **Reliability:** perform function with required precision
- **Efficiency:** resources & code required to perform function
- **Integrity:** controlled access to software / data
- **Usability:** effort required to learn / operate / interpret
- **Maintainability:** effort to test program to ensure functionality
- **Flexibility:** effort required to modify operational program
- **Portability:** effort to transfer to other environments
- **Reusability:** extent to which components can be reused
- **Interoperability:** effort to couple system with another

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## Software qualities

- Software engineering is concerned with software qualities
- Qualities (a.k.a. "ilities") are goals in the practice of software engineering
- The qualities are usually expressed as **non-functional requirements** during the early design stages
- **External** qualities
  - visible to the user
  - reliability, efficiency, usability
- **Internal** qualities
  - the concern of developers
  - they help developers achieve external qualities
  - verifiability, maintainability, extensibility, evolvability, adaptability

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## Software qualities ...

- **Product** qualities
  - concern the developed artifacts
  - maintainability, understandability, performance
- **Process** qualities
  - deal with the development activity
  - products are developed through process
  - maintainability, productivity, timeliness

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For each one of the following software solutions, rate **software qualities** as **not required** or **required**

- Facebook --- Social media
- Netflix --- Recommender system
- Google maps --- location and route
- Hangouts/Facetime --- Video call

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## Software qualities ...

- **Correctness**
  - Ideal quality
  - Established with respect to requirements specification
  - Absolute
- **Verifiability**
  - Ease of establishing desired properties
  - Performed by formal analysis or testing
  - Internal quality

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## Software qualities ...

- **Reliability**
  - Probability that the software will perform its logical operation in the specified environment without failure
  - Statistical quality
  - Probability that software will operate as expected over a give period of time
  - Relative
- **Survivability**
  - Probability that the software will continue to perform or support critical functions when a portion of the system is inoperable
- **Robustness**
  - Reasonable behaviour in unforeseen circumstances
  - Subjective
  - A specified requirement is an issue of correctness

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### Software qualities ...


- Availability
  - 24/7 availability
  - Minimum down time during upgrades (e.g., web services)
- Resiliancy
  - Ability to recover from a failure
  - Applies to hardware, software or data



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### Software qualities ...


- Usability
  - Ability of end-users to easily use software
  - Extremely subjective
- Usefulness
  - How useful is a particular feature?
  - What are the most important bells and whistles?
  - Are there any superfluous bells and whistles?
  - Which operations are most relevant for my task?
- Understandability
  - Ability of developers to understand produced artifacts easily
  - Internal product quality
  - Subjective



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### Software qualities ...


- Performance
  - Equated with efficiency
  - assessable by measurement, analysis, and simulation
- Reusability
  - ability to construct new software from existing pieces
  - must be planned for
  - occurs at all levels: from people to process, from requirements to code



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### Software qualities ...


- Interoperability
  - ability of software (sub)systems to cooperate with others
  - easily integratable into larger systems
  - common techniques include APIs, plug-in protocols, etc.
  - data, control, and presentation integration
  - Examples: XML, SVG, W3C, .NET, Eclipse, scripting
- Scalability
  - ability of a software system to grow in size while maintaining its properties and qualities
  - assumes maintainability and evolvability
  - goal of component-based development



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### Software qualities ...



- Heterogeneity
  - ability to compose a system from pieces developed in multiple programming languages, on multiple platforms, by multiple developers
  - necessitated by reuse
  - goal of component-based development
- Portability
  - ability to execute in new environments with minimal effort
  - may be planned for by isolating environment-dependent components
  - necessitated by the emergence of highly-distributed systems
  - an aspect of heterogeneity



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### Software qualities ...

- Maintainability
  - the ease with which a software system or component can be modified to correct faults, improve performance, or other attributes, or adapt to a changed environment [IEEE 90].
  - Addresses corrective, adaptive, perfective, and preventive maintenance
- Evolvability
  - addresses adaptive, perfective, and preventive maintenance
  - ability to add or modify functionality
  - addresses adaptive and perfective maintenance
  - problem: evolution of implementation is too easy
  - evolution should start at requirements or design

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