# SYSC 5801G
# ADVANCED TOPICS IN COMPUTER-COMMUNICATIONS: OPEN SOURCE BUSINESS

**Fall 2011**
**Department of Systems and Computer Engineering**
**Carleton University**

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Announcements will be distributed by email and Twitter: michaelweissca (#sysc5801)

This course outline is a living document. Improvements may be made as necessary during the term.

Version 0.1

**Instructor availability**
The instructor is available via e-mail any time. Office hours by appointment (online and offline).

**Time and location**
Monday, 6-9pm, ME 4359 and online

**Calendar description**
SYSC 5801T [0.5 credit] Advanced Topics in Computer Communications
Recent and advanced topics in computer-communication networks intended as a preparation for research. Students are expected to contribute to seminars or present lectures on selected topics.

**Course objectives**
The focus of this course will be on the business of open source. The following topics will be covered:

- Why do companies participate in open source projects?
- How to create and manage communities?
- How to collect data on and analyze open source projects?
- How to manage open-source development?
- Role of architecture in open source projects?
- How to capture value from open source projects?
- How to select and use open source licenses?

Problem definition, hypotheses formulation, methods to collect and examine data, and the identification of insights relevant to academics and practitioners are key components of this course.

**Rationale**
This course is designed to build capability and knowledge in the management of open source businesses. An open source business is a business built around an open source offer. Studies of open source have often focused exclusively on open source development. This course will take the broader perspective of how businesses can be built on open source. Students will learn about leveraging open source in products, managing open source communities, and open source business models; gain familiarity with the practitioner and research literature; and become proficient with practical managerial skills, which can add value in their engineering organizations.

**Benefits**
This course prepares students to undertake thesis research or applied projects in the areas of open source development and creating businesses around an open source offer.

**Class Sessions**
Classes are delivered both in-class and online. To join online, go to http://present.sce.carleton.ca and log into the conference “SYSC 5801” with password “student”. For the audio portion of the conference call into 613-366-1985

(local) or 866-964-7085 (toll-free), or use a VOIP connection (eg using Google Talk). When prompted, enter the conference room 85801. When you use a VOIP connection, it is essential that you wear headphones.

Please see detailed instructions on joining an online classroom on the BigBlueButton website:

http://www.bigbluebutton.org/content/videos

For the weekly sessions, there will be assigned readings and tasks. The course material and recordings of the class sessions will be made available on the Moodle learning content management system at http://cms.sce.carleton.ca. The instructor aims to make a version of the slides available before every class, however, they may be updated as a result of in-class discussion. Please check for updates after class. Contact the instructor, if you need an account.

During the student group presentation sessions, groups will be asked to make short presentations on their assignments (max. 10 minutes; please practice so you stay on time). Each group decides who presents what and in which order. Before 6 p.m. EST the day prior to when presentations are due, each group will upload the slides to be presented the next day to Moodle in PDF format. An easy way to convert presentations to PDF is to use Open Office, which can import files from PowerPoint and Word and save them to PDF. (BigBlueButton can also convert from other formats, but you lose control over the conversion results. Better to convert it yourself.)

**Student Evaluation**
Course participants are required to complete two group assignments, participate actively in class (discussion and assigned tasks), and complete a final exam. To determine the course grade, these weights apply:

- Article on class topic (group) 30%
- Case study (group) 20%
- Class participation 20%
- Final exam 30%

Assignments submitted late and presentations not made will receive a grade of zero. All students in a group receive the same grade. Final grade reports will follow Carleton University guidelines.

**Article on class topic**
This is a group assignment. Groups can have between 2 and 3 members, depending on class size.

Write an article for the Open Source Business Resource (OSBR.ca) on a class topic. The article needs to between 1500 and 3000 words in length. Start the article with a thought-provoking quotation. Include a 2-3 paragraph introduction that summarizes the key messages from your article. Any quotations or references in the article need to be properly attributed. References and citations should follow the Academy of Management Review style. Finally, close the article with a 2-3 paragraph summary of the article's main points.

Use the course wiki to write the article and provide feedback.

Author guidelines: http://www.osbr.ca/ojs/index.php/osbr/about/submissions#authorGuidelines

First version due: week 1 after the class
Feedback on first version from peers: week 2 after the class
Final version due: week 3 after the class

**Case study**
This is a group assignment. Groups can have up to 2 or 3 members, depending on class size.

Describe an open source business in 500 to 1000 words. The description should provide content on:

1. Value proposition
2. Customers (marketing and channels)
3. Resources and partners
4. Revenue model

Key questions to ask for each section of the case study will be discussed in class. For the first version, prepare a presentation with slides for each required section. Presentations are 10 min in length. For the final version you also need to submit a document on the wiki. Slides need to be submitted through Moodle.

A list of suggested open source businesses (projects) will be provided, but you can also choose your own.

First version of presentation due: Oct 24
Final version of presentation and document due: Nov 28

**Class participation**
Active class participation is an important component of this class:

1. Participation in class discussions (contribute to lessons learned at the end of each class, lead a discussion, provide feedback on the assignments of your classmates).
2. Start discussions on four topics related to the class material and post them to the forum, and contribute to four discussions created by others. Contributions are evaluated based on their significance.
3. Extract the objectives, deliverables, and contributions from one reading and post it to the wiki.
4. Contribute at least three postings to the course blog with news related to open source businesses, and tag your posts. The tags will appear in a tag cloud on the course website.

**Final exam**
Handed out on the last day of class: Nov 28
Due on: Dec 5, 6pm, to be submitted through Moodle

**Group work and free loaders**
Group work is an important component of this course. You may elect to work in the same group to prepare both assignments or work in two different groups. Group conflicts are to be dealt with by the group in a way that is fair, fast and without personal attacks. The instructor does not settle group disputes.

The instructor will dissolve a group that is late submitting an assignment. A group of three is expected to deliver better work than a group of two.

Free loaders are not welcome anywhere. This course is no exception. The best way to deal with free loaders is to not include their names in the first page of the group assignments. If a student's name does not appear in an assignment submitted by his or her group, the student must submit his or her own assignment. Failure to do so, the student will receive zero for the assignment. There is zero tolerance for free loaders.

**Students with disabilities**
Students with disabilities who require academic accommodations in this course are encouraged to contact the Paul Menton Centre (PMC) for Students with Disabilities to complete the necessary forms. After registering with the PMC, make an appointment with me in order to discuss your needs at least two weeks before the first assignment is due. This will allow for sufficient time to process your request.

**Plagiarism**
Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offence that will not be tolerated. Please refer to the section on instructional offences in the Graduate Calendar for additional information. Plagiarism is against the TIM culture. A case of plagiarism will be referred to the Chair of the Department and the Carleton University Ethics Committee. The instructor will not deal with the matter directly. The university has clear processes to deal with students who are suspected of plagiarism.

**Administrative details**
These are the rules of conduct for this course:

- Please notify the instructor via e-mail if you will not attend a class.
- You must be prepared for each class. You do so by reading the material assigned and being prepared to discuss in class how what was read can be applied in product development organizations.
- Each presenter must upload his/her slides to Moodle by 6pm the day before class.

**Advanced Topics in Computer Communications: Schedule**

| Date | Topic | Readings |
|---|---|---|
| Sep 12 | Session 1:<br>Course overview | • Course outline |
| Sep 19 | Session 2:<br>Introduction | • Lerner & Tirole (2002)<br>• Lerner & Tirole (2005)<br>• Scacchi (2007)<br>• Crowston et al. (2010a) |
| Sep 26 | Session 3:<br>Participation<br><br>Topics for case studies due | • Roberts et al. (2006)<br>• Dahlander (2007)<br>• Fosfuri et al. (2008)<br>• Stuermer et al. (2009) |
| Oct 3 | Session 4:<br>Community | • Dahlander (2008)<br>• von Krogh et al. (2003)<br>• Kazman & Chen (2009)<br>• Bacon (2009) |
| Oct 10 | Session 5:<br>Modeling | • Crowston et al. (2010b)<br>• Madey et al. (2004)<br>• Martinez-Romo (2008)<br>• Nguyen (2010) |
| Oct 17 | Session 6:<br>Process | • Fitzgerald (2006)<br>• Weiss (2009)<br>• Evans (2005)<br>• Subramaniam (2009) |
| Oct 24 | Session 7:<br>Presentation of version 1 of case study | |
| Oct 31 | Session 8:<br>Architecture | • Baldwin (2006)<br>• MacCormack & Baldwin (2010)<br>• Noori & Weiss (2009)<br>• Giuri et al. (2010) |
| Nov 7 | Session 9:<br>Business models I | • Osterwalder & Pigneur (2010)<br>• Weiss (2010)<br>• West & Gallagher (2006)<br>• Bonaccorsi et al. (2006)<br>• Watson et al. (2008) |
| Nov 14 | Session 10:<br>Business models II | • Feller (2006)<br>• van der Linden (2009)<br>• Rajala (2010)<br>• Allarakhia (2010)<br>• West & Mahoney (2009) |
| Nov 21 | Session 11:<br>Licensing | • Link (2010)<br>• Henkel (2006)<br>• Lerner & Tirole (2005)<br>• Gangadharan (2009)<br>• German (2009) |
| Nov 28 | Session 12:<br>Presentation of final version of case study<br>Exam will be handed out | • Lessons learned from the course |
| Dec 5 | Session 13:<br>Final exam due at 6pm | |

**Readings**

To access the required journal articles in electronic form, go to: http://www.library.carleton.ca, and click on "Journals & Journal Articles". Enter the name of the journal, and click "Search". Click on the link (there may be several), and enter your barcode number and PIN. For material on the Web, the URL is provided.

*Readings for Session 2: Introduction*

Lerner, J., & Tirole, J. (2002), Some simple economics of open source, *The Journal of Industrial Economics*, 50(2), 197-234.

Lerner, J., & Tirole, J. (2005), The economics of technology sharing: Open source and beyond, *The Journal of Economic Perspectives*, 19(2), 99–120.

Scacchi, W. (2007), Free/open source software development: Recent research results and emerging opportunities, *European Software Engineering Conference (ESEC) and ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE): Companion Papers*, ACM, 459-468.

Crowston, K., Wei, K., Howison, J., & Wiggins, A. (2010), Free/libre open source software development: What we know and what we do not know, *ACM Computing Surveys*, in press.

*Readings for Session 3: Participation*

Roberts, J.A., Hann, I. & Slaughter, S.A. (2006), Understanding the motivations, participation, and performance of open source software developers: A longitudinal study of the Apache projects, *Management Science*, 52(7), 984-999.

Dahlander, L. (2007), Penguin in a new suit: A tale of how de novo entrants emerged to harness free and open source software communities, *Industrial and Corporate Change*, 16(5), 913-943.

Fosfuri, A., Giarratana, M.S. & Luzzi, A. (2008), The penguin has entered the building: the commercialization of open source software products, *Organization Science*, 19(2), 292-305.

Stuermer, M., Sebastian S. & von Krogh, G. (2009), Extending private-collective innovation: A case study, *R&D Management*, 39(2), 170-191.

*Readings for Session 4: Community*

Dahlander, L. (2008), How do firms make use of open source communities?, *Long Range Planning*, 41, 629-649.

von Krogh, G., Spaeth, S. & Lakhani, K. (2003), Community, joining, and specialization in open source software innovation: A case study, *Research Policy*, 32(7), 1217-1241.

Kazman, R. & Chen, H. (2009), The Metropolis Model: A new logic for development of crowdsourced systems, *Communications of the ACM*, 52(7), 76-84.

Bacon, J. (2009), Governance, *The Art of Community*, O'Reilly, Chapter 8, 211-265, available online at http://www.artofcommunityonline.org. [Note: You only need to read Chapter 8]

*Readings for Session 5: Modeling*

Crowston, K., Howison, J., & Wiggins, A. (2010), Validity issues in the use of social network analysis for the study of online communities, *Journal for the Association of Information Systems*, under review.

Madey, G., Freeh, V., & Tynan, R. (2004), Modeling the free/open source software community: A quantitative investigation, in S. Koch, ed. *Free/Open Source Software Development,* Idea Group Publishing, 203-220.

Martinez-Romo, J., Robles, G., Gonzalez-Barahona, J., Ortuna-Perez, M. & (2008), Using social network analysis techniques to study collaboration between a FLOSS community and a company, *Open Source Development, Communities and Quality*, IFIP 20th World Computer Congress, Working Group 2.3 on Open Source Software, OSS 2008, IFIP 275, Springer, 171-186.

Nguyen, T., Adams, B., & Hassan, A. (2010), Studying the impact of dependency network measures on software quality, *International Conference on Software Maintenance*, IEEE, in press.

*Readings for Session 6: Process*

Fitzgerald, B. (2006), The transformation of open source software, *MIS Quarterly*, 30(3), 587-598.

Weiss, M. (2009), Performance of open source projects, *European Conference on Pattern Languages of Programs*, CEUR, 566, http://ceur-ws.org/Vol-566.

Evans, P., & Wolf, B. (2005), Collaboration rules, *Harvard Business Review*, July/August, 96-102.

Subramaniam, C., Sen, R., & Nelson, M. (2009), Determinants of open source software project success: A longitudinal study, *Decision Support Systems*, 46, 576-585.

*Readings for Session 8: Architecture*

Baldwin, C., & Clock, K. (2006), The architecture of participation: Does code architecture mitigate free writing in the open-source development model?, *Management Science*, 52 (7), 1116-1127.

MacCormack, A., Baldwin, C., & Rusnak, J. (2010), The architecture of complex systems: Do core-periphery structures dominate?, Working Paper 10-059, *Harvard Business School*.

Noori, N. & Weiss, M. (2009), Managing the quality of platform extensions, *FLOSS International Workshop on Free/Libre Open Source Software*.

Giuri, P., Ploner, M., Rullani, R., & Torrisi, S. (2010), Skills, division of labor and performance in collective inventions: Evidence from open source software, *International Journal of Industrial Organization*, 28, 54-68.

*Readings for Session 9: Business Models I*

Osterwalder, A., & Pigneur, Y. (2010), Free as a business model, Chunk 8, *Business Model Generation*, self-published, www.businessmodelgeneration.com, published by Wiley in 2010.

Weiss, M. (2010), Profiting from open source, *European Conference on Pattern Languages of Programs*, http://www.hillside.net/europlop/submission/schedule.cgi.

West, J. & Gallagher, S. (2006), Challenges of open innovation: the paradox of firm investment in open-source software, *R&D Management*, 36(3), 319-331.

Bonaccorsi, A., Giannangeli, S., & Rossi, C. (2006), Entry strategies under competing standards: Hybrid business models in the open source software industry, *Management Science*, 52(7), 1085-1098.

Watson, R., Boudreau, M.C., York, P., Greiner, M., & Wynn, D. (2008), The business of open source, *Communications of the ACM*, 51(4), 41-56.

*Readings for Session 10: Business Models II*

Feller, J., Finnegan, P., & Hayes, J. (2006), Open source networks: An exploration of business model and agility issues, *European Conference on Information Systems*, http://is2.lse.ac.uk/asp/aspecis/20060179.pdf

van der Linden, F., Lundell, B., & Marttlin, P. (2009), Commodification of industrial software: A case for open source, *IEEE Software*, July/August, 77-83.

Rajala, R. (2010), Strategic flexibility in open innovation: Designing business models for open source software, *European Journal of Marketing*, forthcoming.

West, J. & O'Mahony, S. (2008), The role of participation architecture in growing sponsored open source communities, *Industry & Innovation*, 15(2), 145-168.

Allarakhia, M., Kilgour, M., & Fuller, D. (2010), Modelling the incentive to participate in open source biopharmaceutical innovation, *R&D Management*, 40(1), 50-66.

*Readings for Session 11: Licensing*

Link, C. (2010), Patterns for the commercial use of open-source: Legal and licensing aspects, *European Conference on Pattern Languages of Programs*, http://www.hillside.net/europlop/submission/schedule.cgi.

Henkel, J. (2006), Selective revealing in an open innovation processes: The case of embedded Linux, *Research Policy*, 35, 953-969.

Lerner, J. & Tirole, J. (2005), The scope of open source licensing, *The Journal of Law*, 21(1), 20-56.

Gangadharan, G.R., D'Andrea, V., De Paoli, S., and Weiss, M., Managing license compliance in free and open source software development, *Information Systems Frontiers*, Springer, published online in May 2009.

German, D., & Hassan, A. (2009), License integration patterns: Addressing license mismatches in component-based development, *International Conference on Software Engineering*, 188-198.

**Suggested books**

The following books are optional, but they allow you to pursue specific topics of the course in more detail. Some of these books can also be downloaded online or have significant web resources.

Benkler, Y. (2006), *The Wealth of Networks: How Social Production Transforms Markets and Freedom*, Yale University Press. [http://cyber.law.harvard.edu/wealth_of_networks/Main_Page]

Bruggeman, J. (2008), *Social Networks: An Introduction*, Routledge. [http://sites.google.com/site/jebrug/jeroen-bruggeman-social-science]

Deek, F., & McHugh, J. (2008), *Open Source: Technology and Policy*, Cambridge University Press.

Elie, F. (2009), *Economie du Logiciel Libre*, Eyrolles.

Evans, D., Haigu, A. & Schmalensee, R. (2006), Invisible Engines: How Software Platforms Drive Innovation and Transform Industries, MIT Press. [http://mitpress.mit.edu/catalog/item/ebook.asp?ttype=2&tid=10937]

Feller, J., & Fitzgerald, B. (2001), *Understanding Open Source Software Development*, Addison-Wesley.

Feller, J., & Fitzgerald, B., et al. (2005), *Perspectives on Free and Open Source Software*, MIT Press.

Fink, M. (2002), *The Business and Economics of Linux and Open Source*, Prentice Hall.

Fogel, K. (2006), *Producing Open Source Software: How to Run a Successful Free Software Project*, O'Reilly.

Goldman, R. & Gabriel, R. (2005), *Innovation Happens Elsewhere: Open Source as Business Strategy*, Morgan Kaufmann. [http://www.dreamsongs.com/IHE/IHE.html]

Kelty, C. (2008), *Two Bits: The Cultural Significance of Free Software*, Duke University Press.

Meeker, H. (2008), *The Open Source Alternative: Understanding Risks and Leveraging Opportunities*, Wiley.

Osterwalder, A. & Pigneur, Y. (2009), *Business Model Generation*, Wiley, 2010.

Rosenberg, S. (2007), *Dreaming in CODE*, Crown.

Tuomi, I. (2006), *Networks of Innovation*, Oxford University Press.

Weber, S. (2005), *The Success of Open Source*, Harvard University Press.

Van Wendel de Joode, R., Bruijn, J.A., & van Eeten, M.J.G. (2003), *Protecting the Virtual Commons: Self-Organizing Open Source and Free Software Communities and Innovative Intellectual Property Regimes*, Asser Press. [http://dlc.dlib.indiana.edu/archive/00001075/00/Protecting_the_Virtual_Commons.pdf]