SUBJECT OUTLINE

36102 iLab 1

Course area	UTS: Analytics and Data Science
Delivery	Spring 2019; City
Credit points	12cp
Requisite(s)	36100 Data Science for Innovation AND 36103 Statistical Thinking for Data Science AND 36106 Data, Algorithms and Meaning These requisites may not apply to students in certain courses. There are also course requisites for this subject. See access conditions.
Result type	Grade, no marks

Attendance: on campus (2 x 3hrs, 2 x 4hrs, 2 x 7hrs); independent online work and negotiated mentoring and industry sessions

Requisite elaboration/waiver:

Any student wishing to enrol in first- and second-year subjects concurrently, needs to apply for a waiver.

Subject coordinator

Adrian Buck

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Subject description

In this transdisciplinary innovation lab, students work individually and in teams to investigate traditional and emerging big data sets, and test theories or frameworks prior to rapidly developing a data driven prototype or proof of concept. In the iLab, they generate creative possibilities by combining new data sources with existing data. Each student and team is provided with a 'sandbox' to support them in designing experiments (for real or simulated stakeholders), evaluating the potential of different software technologies and developing key aspects of thinking like a data science professional. They consider the implications of their findings for different stakeholders and write a range of data narratives to explore the communication of data results for different purposes. Immersed in a lab environment oriented towards innovation and the execution of data driven experiments using real life, 'messy' data sets, students develop and study different workflows handling the extraction of value from diverse data types.

Subject learning objectives (SLOs)

Upon successful completion of this subject students should be able to:

1. Evaluate dynamic real-time data flows and identify the challenges of big and sparse data for understanding and acting on a system.
2. Contrast patterns and predictors for data discovery for the development of data science capabilities within organisations.
3. Explore concepts, frameworks and processes from other fields for their relevance to data science theory and practices in data driven experiments.
4. Construct a bricolage of problem solving approaches involving statistics and data formulations, visual explorations and machine learning techniques to discover deeper insights.
5. Deliver advice to stakeholders in the form of a multimodal narrative synthesis of the knowledge gained from data investigations, bridging the gap between data and human insight.
6. Apply relevant legislation and regulation and an understanding of stakeholders' values to develop "privacy by design".

7. Utilise understanding of team dynamics in complex organisational settings to design a team that can build and successfully deliver real-life and complex data driven projects.

Course intended learning outcomes (CILOs)

This subject also contributes specifically to the development of the following course outcomes:

- **Understanding relationships & processes within systems**
  Identify and represent the human and technical elements and processes within complex systems and organise them within frameworks of relationships (1.1)

- **Exploring and testing models and describing behaviours of complex systems**
  Explore and test models and generalisations for describing the behaviour of sociotechnical systems and selecting data sources, taking into account the needs and values of different contexts and stakeholders (1.2)

- **Making predictions and informing data discovery**
  Analyse the value of different models, established assumptions and generalisations, about the behaviour of particular systems, for making predictions and informing data discovery investigations (1.3)

- **Making the invisible visible**
  Use transdisciplinary approaches to seeing and doing to uncover underrepresented, or misrepresented, elements of a system (1.4)

- **Critiquing trends and theoretical frameworks**
  Critique contemporary trends and theoretical frameworks in data science for relevance to one's own practice (2.1)

- **Exploring, interpreting and visualising data**
  Explore, analyse, manipulate, interpret and visualise data using data science techniques, software and technologies to make sense of data rich environments (2.2)

- **Understanding uncertainty, ambiguity and complexity**
  Understand and deal critically and openly with the uncertainty, ambiguity and complexity associated with people, systems and data (2.3)

- **Designing and managing data investigations**
  Apply and assess data science concepts, theories, practices and tools for designing and managing data discovery investigations in professional environments that draw upon diverse data sources, including efforts to shed light on underrepresented components (2.4)

- **Developing strategies for innovation**
  Explore, interrogate, generate, apply, test and evaluate problem-solving strategies to extract economic, business, social, strategic or other value from data (3.1)

- **Working together**
  Develop a collaborative and team-oriented mindset to harness value for stakeholders to produce innovative solutions to challenges (3.3)

- **Developing communication skills**
  Collaborate to develop and refine multimodal communication skills needed to successfully work in data science teams (4.1)

- **Engaging audiences**
  Explore and craft interpretative narratives that engage key audiences with data analytics and potential significance for action, at a societal, industrial, organisational, group or individual levels (4.2)

- **Informing decision making**
  Develop, test, justify and deliver data project propositions, methodologies, analytics outcomes and recommendations for informing decision-making, both to specialist and non-specialist audiences (4.3)

- **Becoming a reflective data practitioner**
  Engage in active, reflective practice that supports flexible navigation of assumptions, alternatives and uncertainty in professional data science contexts (5.1)

- **Embracing ethical responsibilities**
  Interrogate and justify ethical responsibilities related to data selection, access, analysis and governance to create a framework for practice (5.2)

Contribution to the development of graduate attributes

The subject provides opportunities for you to immerse yourself in a lab environment to work with real-world challenges. You engage with stakeholders and negotiate projects that can create value through data-driven experiments. As part of this subject, you set your own learning goals and objectives and develop negotiated criteria for assessment.

So your experiences as a student in this subject support you to develop the following graduate attributes (GA):

- GA 1 - Sociotechnical systems thinking
- GA 2 - Creative, analytical and rigorous sense making
- GA 3 - Create value in problem solving and inquiry
- GA 4 - Persuasive and robust communication
- GA 5 - Ethical citizenship and leadership

Teaching and learning strategies

Transdisciplinary approach: Through a dynamic immersion into the world of designing creative, value-driven solutions, a design laboratory brings together the theoretical and practical strands of data science innovation in this first capstone iLab subject. An evolving, emergent approach to data science challenges is implemented in team projects students choose to tackle over the session. Students work as innovators looking to add value to particular organisational or community challenges to produce working prototypes that could be the seed for real organisational innovation or a start-up enterprise at the end of session.

Team collaborations: students collaborate in design teams and utilise diverse perspectives to innovate and solve problems in data science and innovation. Disruptive, controversial and speculative thinking, as well as reflection are built upon to encourage critical approaches to working in teams.

Interactive workshops and masterclasses: Presentation and discussion formats involve introductions to innovative practice as well as critical debate and reflection of learning in context. Dynamic and interactive workshop sessions draw on speakers and trainers for workshops and master classes. These build upon in-class exercises and presentations to provide opportunities to develop innovative practice suited to data science contexts.

Online work: Canvas and other online media applications continue to be used to share information and encourage interaction between students, staff, stakeholders and experts drawn into the iLab program. Students post ongoing research and notes towards their project work, some of which they share with peers and staff for the purposes of feedback.

Design journal: Individual work in a design journal will provide opportunities for personal reflection and integration of the team's work on the emerging innovations. Regular feedback opportunities from peers and the iLab team are available in class sessions and online. Portfolio thinking continues to frame students' curation, consolidation and communication of evidence of their learning and development of graduate attributes and professional evolution.

Content (topics)

- Human-centred approaches to data value
- Design-led innovation process and mindset
- Innovation research tools and methods: Expert and practitioner sessions, students sharing and reflecting.
- Working in the field.
- Innovation Plan and Report: Working on the chosen challenge in combination of fieldwork, small group and individual tutorials.

Program

Week/Session	Dates	Description
Project Selection		Project selection and allocation requirements will be communicated by the Subject Coordinator and FTDi Partnerships team prior to the start of session.
Week 1	22 July	- Initial client contact / getting to know your client - Taking the brief

Week 2	29 July	**On-campus sessions:**
		Friday 2 August (2-6pm):Subject introduction
		Saturday 3 August (9-5pm):Project planning workshop
		- Goals setting - Project and communication planning - Student-developed assessment criteria
Week 3	5 August	- Self-study - Contact with clients - Blogging and starting with the Design Journal
Week 4	12 August	**Mapping out your project plan and your skills development** - Knowledge mapping - Managing data in your project - Implications for project's goals **and** for professional development goals
Week 5	19 August	**Peer feedback activity (in CICAround)** Within your peer-support group you will share and discuss - One journal entry you are prepared to share with peers - Current Project Goals - Current Learning Goals
Week 6	26 August	Self-study and contact with clients and mentors
Week 7	2 September	**On-campus sessions:** **Friday 6 September (2-6pm):Project progress update** **Saturday 7 September (9-5pm):Technical workshop**
StuVac	9 September	Continue reflecting in Design Journal
Week 8	16 September	**On-campus update session:** **Thursday 19 September (6-9pm)**
Week 9	23 September	Milestone meetings with clients and peer-support groups
Week 10	30 September	Preparing your client brief/presentation
Week 11	8 October	Self-study and communication with clients and mentors

Week 12	14 October	Finalise your Design Journal submission, preparing a synopsis that evaluates your achieved outcomes with evidence
		On-campus session:
		Thursday 17 October (6-9pm)
		Final student presentations (clients in attendance)
StuVac	21 October	
Assessment Period	26 Oct - 9 Nov	Final Assessment Period

Assessment

A detailed Assessment Brief outlining specific requirements for each assessment task will be available in Canvas. Ensure you consult these briefs *before* you undertake the assessment tasks.

Assessment task 1: Project Design Journal

Objective(s): 1, 2, 3, 4, 5 and 6

Type: Project

Weight: 40%

Task: Throughout the semester students maintain a design journal (within their CICAround blogs) recording their project work, activities and ongoing reflections. Interim submissions are offered for peer review and formative feedback. In addition to the pre-defined assessment criteria, students discuss and develop two criteria to assess their own individual professional goals.

Length: 14-20 pages/screens (approximately)

Due: Part A: Learning Goals and Weekly entries 12 August, 9am; Part B: Interim Status Report 23 September, 9am; Part C: Project Design Journal 17 October, 9am. All components submitted via Canvas.

Assessment task 2: Project Showcase

Objective(s): 1, 2, 3, 5 and 7

Type: Presentation

Weight: 30%

Task: A multimodal narrative summarisation of the knowledge gained from their data investigations throughout the semester so that they can deliver advice in story form to their client.

Length: 15 minutes, with supporting documentation and data as required by the client brief

Due: Client briefing/presentation (in class): 17 October (6-9pm). Supporting documentation: 4 November, 9am

Assessment task 3: Professional Showcase

Objective(s): 1 and 7

Type:　Portfolio

Weight:　30%

Task:　A showcase of students work demonstrating their new skills and knowledge framed as an account for a public audience. The topic and form of the work as well as the intended target audience are negotiated with the subject coordinator, but should build on work that the student undertakes in their design journal throughout the semester.

Length:　Negotiated with subject coordinator

Due:　9.00am Monday 4 November 2019

Minimum requirements

Students must attempt each assessment task and achieve an overall pass mark in order to pass this subject.

Late penalties apply to all assessment tasks as outlined in the FTDi FYI student booklet. Please consult this booklet for other useful information including Special Consideration, Plagiarism, Extension, and Student Support Services.

Recommended texts

For a round up of resources for managing & working with personal data – standards, best practice, anonymisation issues, please visit:

https://research-data-network.readme.io/v1.03/docs/personal-data-resources

References

This is an indicative reference list. Specific texts students will be expected to read will be listed in Canvas and available as an electronic resource at UTS Library.

Baesens, B. 2014, Analytics in a big data world: the essential guide to data science and its applications, Wiley, Hoboken, NJ.

Brown, T., Katz, B. 2009. Change By Design: How Design Thinking Transforms Organisations And Inspires Innovation. New York: Harpercollins.

Bucolo, S., Wrigley, C. & Matthews, J. 2012, 'Gaps in organizational leadership: Linking strategic and operational activities through design-led propositions', Design Management Journal, vol. 7, no. 1, pp. 18-28.

Bucolo, S. & Wrigley, C. 2014, 'Design-led innovation: overcoming challenges to designing competitiveness to succeed in high cost environments' in Roos, G. & Kennedy, N. (eds), Global Perspectives on Achieving Success in High and Low Cost Operating Environments, IGI Global, pp. 241-251.

Christensen, C. M., Baumann, H., Ruggles, R., & Sadtler, T. M. 2006. Disruptive Innovation For Social Change. Harvard Business Review, 84(12).

Davenport, T.H. 2014, Big data at work: dispelling the myths, uncovering the opportunities, Harvard Business Review Press, Boston, MA.

Davila, T. & Epstein, M. 2014, The innovation paradox: why good businesses kill breakthroughs and how they can change, Berrett-Koehler, San Francisco, CA.

De Brabandere, L. & Iny, A. 2013, Thinking in new boxes: a new paradigm for business creativity, Random House, New York, NY.

Dobelli, R. 2013, The art of thinking clearly, Harper Collins, New York, NY.

Kahneman, D. 2011, Thinking, fast and slow, Farrar, Straus and Giroux, New York, NY

Manoochehri, M. 2013, Data just right: introduction to large-scale data & analytics, Pearson Education, Upper Saddle River, NJ

Provost, F. & Fawcett, T. 2013, Data science for business: what you need to know about data mining and data-analytic thinking, O'Reilly Media, Sebastopol, CA.

Schweitzer, J., Jakovich, J. 2012. Crowd-share Innovation - Intensive Creative Collaborations, Freerange Press, Sydney.

Tidd. J, Bessant, John., J. (2013), Managing Innovation, 5th Ed, John Wiley & Sons. Chichester, UK.

Watson, R. & Freeman, O. 2013, Futurevision: scenarios for the world in 2040, Scribe Publications, Brunswick, Vic, Australia.

Weinberger, D. 2014, Too big to know: rethinking knowledge now that the facts aren't the facts, experts are everywhere, and the smartest person in the room is the room, Basic Books, New York, NY.

Other resources
Canvas and CIC Around will be used to distribute course material (including recommended readings), announcements and facilitate discussions

Academic integrity
Where individual work is required for the purposes of assessment, the copying, unacknowledged use of, or reliance on the work of other individuals without acknowledgment is considered to be cheating/misconduct. The penalties imposed for cheating/misconduct or allowing work to be plagiarised are severe under the University rules and regulations.

Plagiarism is one of the most serious crimes in the academic community. It indicates an attempt by someone to pass off the words and/or ideas of another as their own; this principle similarly applies to datasets, the sources for which must be noted. To take any but a few sequential words of another without acknowledgment is plagiarism and tantamount to cheating.

It is expected that the work you submit in this subject is original in nature. That is, it should be created by you, and for the purposes of this assignment. Re-use of previous assignments without appropriate credit and permission is considered an act of self-plagiarism, and is treated in the same way. You may not re-use an existing assignment (of yours, or another student) in this subject.

Acts of plagiarism are penalised.

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