

課程大綱

課程資訊 (Course Information)			
學分數	0.5 學分(9 小時)	人數限制 Class Size	60
中文名稱 Course Title	貝氏建模與計算		
英文名稱 Course English Title	Bayesian Modeling and Computation		
任課教師 Instructor	Hsin-Hsiung Bill Huang		
上課時間 Time	2024 年 5 月 28 日 9:00-11:00 (2 小時) 2024 年 5 月 30 日 9:00-11:00 (2 小時) 2024 年 6 月 04 日 9:00-11:00 (2 小時) 2024 年 6 月 06 日 8:00-11:00 (3 小時)	上課教室 Room	綜三 837
課程簡述 (Brief course description)			
<p>Bayesian data analysis refers to practical inferential methods that use probability models for both observable and unobservable quantities. The flexibility and generality of these methods allow them to address complex real-life problems that are not amenable to other techniques. This course will provide a pragmatic introduction to Bayesian methodology and their powerful applications. Topics include: the basics of Bayesian inference for single and multiparameter models, regression, hierarchical models, model checking, approximation of a posterior distribution by iterative and non-iterative sampling methods, missing data, and Bayesian nonparametrics. Specific topics and the course outline are subject to change as the semester progresses. All topics will be motivated by problems from the physical, life, social, and management sciences. Conceptual understanding and inference via computer simulation will be emphasized throughout the course.</p> <p>Course/Learning Objectives:</p> <ol style="list-style-type: none"> 1. Acquire fluency in the modeling and computation of Bayesian data analysis. 2. Apply Bayesian methodology to solve real-life 3. Utilize R for Bayesian computation, visualization, and analysis. 4. Term projects with an oral presentation and written 			
課程大綱 (Syllabus)			
<p>Course outline and tentative course schedule:</p> <p>Note: The instructor reserves the right to modify the course content, sequence of topics, and course assignments during the progress of the course.</p> <p>Lecture 1: An introduction to the Gibbs sampler, MCMC and the Metropolis- Hastings algorithm. Lectures 2: Bayesian hierarchical models, the Metropolis-Hastings and Gibbs samplers and Convergence Diagnosis. Lecture 3: Hierarchical linear models: Bayesian GLM and Bayesian Hierarchical GLMM. Lecture 4: Gaussian Process, Bayesian Optimization and Bayesian clustering.</p> <p>Required Textbook:</p> <ol style="list-style-type: none"> 1. Gelman A., Carlin J.B., Stern H.S., Dunson D.B., Vehtari A., Rubin D.B. (2013). Chapman and Hall/CRC. ISBN 978-1439840955. Textbook is here: https://users.aalto.fi/~ave/BDA3.pdf. 			

2. Jim Albert: *Bayesian Computation with R*. Available as e-book; see also here. We cover (parts of) the chapters listed under "Program".
3. Robert and Casella: *Introducing Monte Carlo Methods with R*. Available as e-book. Also available: Solutions to odd-numbered exercises, and errata/ additional errata. We cover parts of the chapters listed under "Program".

Supplementary Textbooks:

4. Christensen R., Johnson W., Branscum A., Hanson T.E. (2010). *Bayesian Ideas and Data Analysis: An Introduction for Scientists and Statisticians*. Chapman and Hall/CRC. ISBN 978-1439803547.
5. Carlin B.P., Louis T.A. (2008). *Bayesian Methods for Data Analysis* (3rd ed.). Chapman and Hall/CRC. ISBN 978-1584886976.
6. *A First Course in Bayesian Statistical Methods*, Hoff, P. (2009). Springer: New York.