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| **FIJI NATIONAL UNIVERSITY** |
| **COLLEGE OF ENGINEERING, SCIENCE AND TECHNOLOGY** |
| **SCHOOL OF APPLIED SCIENCES** |
| **DEPARTMENT OF METEOROLOGICAL AND ENVIRONMENTAL SCIENCES** |
| **POSTGRADUATE DIPLOMA/MASTER OF INTERDISCIPLINARY STUDIES IN CLIMATE CHANGE RESILIENCE AND MITIGATION** |
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| **LECTURER:** | TBA |
| **OTHER LECTURERS:** | TBA |
| **COURSE CODE:** | ESM 803 |
| **TITLE:** | Climate Change Impact and Adaptation in the South Pacific  |
| **MODE:** | Face to Face |
| **TERM:** | Semester 2 |
| **VENUE:** | Nabua, Suva & Natabua, Lautoka |
| **LECTURES**: | Students are to attend 1 x 3 hours of lectures per week. |
| **TUTORIALS:** | Students are to attend 1 x 1 hour tutorial class per week. |
| **LABS:** | Students are to attend 1 x 4 hours of Labs per week.  |
| **WORKSHOPS:** | Not Applicable |
| **FIELD TRIPS:** | Not Applicable |
| **CONSULTATION TIME:** | Subject to my availability, students can OPENLY visit my office to discuss issues relating to the course / this unit |
| **PREREQUISITE:** | Minimum GPA of 3.0 in any undergraduate degree |
| **E-INFORMATION:** | All pertinent information relating to the course shall be posted on Moodle and emails. Students are required to check Moodle, emails and notice boards regularly for communication from the lecturer.  |
| **TOTAL LEARNING HOURS**: | **Contact Hours** | **112** |
|  | Lectures | 42 |
|  | Tutorials | 14 |
|  | Labs/Workshops/Practicals | 56 |
|   | Self-Directed Learning Hours | 188 |
|   | **Total Recommended Learning Hours** | **300** |
|   | **Credit Points** | **30** |
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| **1.0 Welcome** |
| I welcome you to this Course and hope that you will find it enriching and interesting. |
| **1.1 Course Description** |
| This course will provide an overview of climate change impacts, assessment and predictions, and key concerns and strategies of adaptation to climate change in the South Pacific. The course focuses on climate change impacts related to physical and human environment, including human health, food security, and the human response to climate change such as efforts to adapt, as well as efforts to avoid or reduce the negative impacts of climate change. Using IPCC Assessment Reports as the main reference together with recent complementary and contrasting findings, the relevant scientific tools are applied to analyze and discuss the different aspects of climate change. The course covers environmental risks and hazards, vulnerability assessment, climate impact causation, impact assessment methods, sector and regional climate change impact predictions, adaptation strategies, and adaptation policy frameworks.  |
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| **1.2 Learning Targets/Outcomes** |
| On successful completion of this course, students will be able to: |
|  1.2.1 Demonstrate an understanding of the causes (natural and anthropogenic) of climate change and relate these to impacts both at global and local through case studies, literature review and direct observations.  |
| 1.2.2 Utilize relevant scientific tools to analyze the options, constraints, costs and benefits for climate change impact and relevant adaptation for various communities |
| 1.2.3 Evaluate various climate change mitigation strategies and climate change policy options and appropriateness |
| 1.2.4 Analyse the ecological, social and economic aspects of climate change, impacts on human health and food security, adaptation and mitigation options on a global, regional and local scale  |
| 1.2.5 Critique, analyse and compare and contrast the carbon footprints from different institutional bodies. |
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| **2.0 Recommended Resources - these will be revised as and when needed** |
| **2.1 Textbooks** |
| 2.1.1 Hardy, J. T. (2003). Climate change: causes, effects, and solutions. John Wiley & Sons. |
| 2.1.2 Richardson, K., Steffen, W., & Liverman, D. (Eds.). (2011). Climate change: Global risks, challenges and decisions. Cambridge University Press. |
| 2.1.3 IPCC, 2007: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth AssessmentReport of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E.Hanson, Eds., Cambridge University Press, Cambridge, UK, 976pp. |
| 2.1.4 Barnett, J. (2001). Adapting to climate change in Pacific Island countries: the problem of uncertainty. World Development, 29(6), 977-993. |
| 2.1.5 Pittock, AB Climate change: turning up the heat (CSIRO/ Earthscan, 2005) |
| **2.2 Supplementary Materials** |
| Supplementary notes will either be given during the lectures or placed on Moodle. |
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| **3.0 Course Content and Reading References** |
| **Week 1: Climate Science and Climate Change**  |
| 1.1 Climate science  |
| 1.2 Climate change and climate variability  |
| 1.3 Climate change debate and issues |
| Labs/Workshops etc. - Reading - collection of case studies and discussion on the changes that are observed.  |
| **Readings:**   |
| 2.1 IPCC, 2007: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 976pp. |
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| **Week 2: Climate Change Adaptation and Mitigation** |
| 1.1 Principles, approaches and policies of adaptation and mitigation to climate change and their impacts |
| 1.2 Global impact of mitigation and balance between mitigation and adaptation  |
| 1.3 Low Carbon Energy Technologies as Mitigation approach  |
| 1.4 Potential mitigation strategies with relevant technologies and economic benefits |
| 1.5 Carbon sequestration, energy system transformation and renewable energy technologies, carbon trading and carbon offsetting |
| 1.6 Economic approaches, instruments and geopolitics and governance (Contemporary global scenario) |
| Labs/Workshops etc. Carbon Food Prints Calculations |
| **Readings:** |
| 2.1 Global Climate Change: Turning Knowledge into Action. 2014. David Kitchen (ISBN-10: 0321634128 • ISBN-13: 9780321634122) Prentice Hall |
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| **Week 3 Climate Change Impacts on Agriculture, Forest and Biodiversity and Adaptations** |
| 1.1 Impacts of climate change and potential adaptation strategies in different agricultural and forest areas and biodiversity including biodiversity, genetic loss, nutrient or mineral loss, etc. |
| 1.2 Climate change impacts and adaptation practices for ecosystems, land use, water resources, constraints, costs and benefits, etc. |
| 1.3 National climate change agricultural, forest and biodiversity adaptation strategies from selected developed and developing countries  |
| Labs/Workshops etc. Modeling climate change impact on Vitilevu - describe baseline climates, examine current climate variability and extremes, assess risks – present and future and investigate adaptation – present and future  |
| **Readings:** |
| 2.1 Barnett, J. (2001). Adapting to climate change in Pacific Island countries: the problem of uncertainty. World Development, 29(6), 977-993. |
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| **Week 4 Climate Change Impacts on Fresh Water and Ocean Sources and Adaptations** |
| 1.1 Impacts of climate change and potential adaptation strategies in different areas regarding fresh water shortage due to droughts and inundation or flooding due to heavy rain, etc. |
| 1.2 Climate change impacts and adaptation practices for marine ecosystems due to ocean acidification, coral bleaching, beach erosion, tidal waves, salt water intrusion, etc |
| 1.3 National climate change water adaptation strategies from selected developed and developing countries  |
| Labs/Workshops etc.-Visit to the beach areas which are stabilized by placing boulders, where artificial and natural methodologies are utilized to minimize beach erosion |
| **Readings:** |
| 2.1 Pittock, AB Climate change: turning up the heat (CSIRO/ Earthscan, 2005) |
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| **Week 5: Climate Change Impacts on Food Security and Adaptations** |
| 1.1 Impacts of climate change on food security including food safety in microbial contamination, ciguatera fish poisoning, food quantity and food quality leading to various forms of food related diseases including NCD, etc. |
| 1.2 Climate change adaptation practices for sustainable food supply system including marine and fresh water food systems, agricultural food systems on salt-water tolerance, drought tolerance food plants, etc.  |
| 1.3 National climate change food security adaptation strategies from selected developed and developing countries  |
| Labs/Workshops etc. Modeling climate change impact on Vitilevu - describe baseline climates, examine current climate variability and extremes, assess risks – present and future and investigate adaptation – present and future  |
| **Readings:** |
| 2.1 Pittock, AB Climate change: turning up the heat (CSIRO/ Earthscan, 2005) |
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| **Week 6: Climate Change Impacts on Urban Areas, Human Health and Infrastructure and Adaptations** |
| 1.1 Impacts of climate change on urban areas and human health and diseases |
| 1.2 Climate change adaptation practices for sustainable infrastructure including homes, etc.  |
| 1.3 National climate change food security adaptation strategies from selected developed and developing countries  |
| Labs/Workshops etc.-Visit to Village to observe the traditional knowledge being used in adapting to climate change or relevant stakeholder presentation |
| **Readings:** |
| 2.1 Pittock, AB Climate change: turning up the heat (CSIRO/ Earthscan, 2005) |
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| **Week 7: Climate Change Policy and Social Impacts**  |
| 1.1 Current status of international climate change negotiations  |
| 1.2 Climate Change Policy  |
| 1.3 Socio-economic adaptability, to reduce the negative impacts of climate change.  |
| Labs/Workshops etc.- Discuss climate change policy issues, case studies |
| **Readings:** |
| 2.1 Environmental Impact Assessment for Developing Countries in Asia. Volume 1 - Overview. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu. 1997. Asian Development Bank. 356 pp. Recommended self -learning hours including reading time 13 |
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| **Week 8: Mid Semester Break** |
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| **Week 9: Vulnerability of the Pacific Islands Small Island Countries and Adaptations** |
| 1.1 Vulnerability related to inundation and flooding, beach erosion, saltwater intrusion, infrastructure and society |
| 1.2 Impacts on infrastructure and society  |
| 1.3 Case Study: Beru and Butaritari Islands, Kiribati |
| 1.4 Case study: Nadi Town, Fiji, Case study: Rewa Delta, Fiji. |
| Labs/Workshops etc. Visit to the NGOs working in the area of climate change, to discuss on the strategies that are been implemented by them. Write a report of their pros and cons, and how one could improve on them. |
| **Readings:** |
| 2.1 IPCC, 2007: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth AssessmentReport of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E.Hanson, Eds., Cambridge University Press, Cambridge, UK, 976pp. |
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| **Week 10:Equity Issues** |
| 1.1 The equity challenges and climate policy |
| 1.2 Responsibilities, Vulnerabilities and in equity in the response to climate change |
| 1.3 A long term perspective on climate change: values and ethics |
| Labs/Workshops etc.- Integrating gender equality and women empowerment in climate change programs, case studies |
| **Readings:** |
| 2.1 Pittock, AB Climate change: turning up the heat (CSIRO/ Earthscan, 2005) |
| 2.2 . Barnett, J. (2001). Adapting to climate change in Pacific Island countries: the problem of uncertainty. World Development, 29(6), 977-993. |
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| **Week 11:The Architecture of Climate change Policy** |
| 1.1 Emergence of climate change as a global policy issue |
| 1.2 The UNFCCC and the Kyoto Protocol |
| 1.3 The Global Environmental Facility |
| 1.4 The Alliance of Small Island States |
| 1.5 The Pacific Island Forums |
| Labs/Workshops etc.-video of a conference, discussion on the relevance and effectiveness of the treaties, perhaps a representative from the Dept. of Environment, who deals with these treaties is invited to gain more insight |
| **Readings:** |
| 2.1 Hardy, J. T. (2003). Climate change: causes, effects, and solutions. John Wiley & Sons. |
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| **Week 12: Commcoursey based adaptation and implementation**  |
| 1.1 Commcoursey based adaptation in Fiji and Pacific countries |
| 1.2 Vulnerable groups (Global) |
| 1.3 Tackling sea level rise in local communities and urban centers |
| 1.4 Pacific Science Initiatives - SPREP Initiatives, START- Oceania |
| Labs/Workshops etc.- Visit to an affected commcoursey or impacts of climate change on island |
| **Readings:** |
| 2.1Barnett, J. (2001). Adapting to climate change in Pacific Island countries: the problem of uncertainty. World Development, 29(6), 977-993. |
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| **Week 13: Integrating adaptation, mitigation and sustainable development** |
| 1.1 Framework of integration |
| 1.2 Integrating adaptation and sustainable development  |
| 1.3 Integrating mitigation and sustainable development  |
| 1.4 Implementation of integration approaches; Trade-offs, sector approaches (Agriculture, Forest and Biodiversity) to integrating adaptation, mitigation and development. |
| Labs/Workshops etc.- Visit to relevant organization to see the coral planting |
| **Readings:** |
| 2.1 Global Climate Change: Turning Knowledge into Action. 2014. David Kitchen (ISBN-10: 0321634128 • ISBN-13: 9780321634122) Prentice Hall |
| 2.2 Fiji Sustainable Development Framework |
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| **Week 14** |
| 1.1 International partners: effective interventions and assistance |
| 1.2 Regional and national (government) action |
| 1.3 Commcoursey-level action |
| 1.4 Role of non-government organizations (NGOs) |
| 1.5 Individual understanding and action |
| 1.6 Revision |
| Labs/Workshops etc.- Climate interactive exercise |
| **Readings:** |
| 2.1 Global Climate Change: Turning Knowledge into Action. 2014. David Kitchen (ISBN-10: 0321634128 • ISBN-13: 9780321634122) Prentice Hall |
| **Week 15: Revision and Presentation** |
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| **Week 16: Study Break**  |
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| **Week 17 & 18: Examination Week** |
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| **4.0 Assessment** |
| **Component** | **Weighting** | **Minimum Level** |
| Labs/workshops | 15% | 50% |
| Seminar | 5% |
| 2 Short Tests | 10% |
| Project (mini research) Work | 30% |
| Final Examination | 40% |
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| **Dates:** |
| (a) Short Test and other assessment will be as follows: |
| **Assessment** | **Date** | **Weighting** |
| short test 1 | Week 7 | 5% |
| short test 2 | Week 13 | 5% |
| Research Project Report & Presentation (mini research) | Week 10 - Week 13 | 35% |
| Labs/workshops/seminars | Week 1 - Week 4 | 15% |
| Final Examination | Weeks 17 & 18 | 40% |
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| (b) In order to pass the course, that is, to obtain a grade of C- or better, it is necessary for students get a minimum attendance of 75% and pass the coursework and score at least 50% (i.e. 50/100) in the final examination. It is highly recommended that students attend all tutorials/labs/workshops. The following grading system will be used: |
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| **Letter Grade Scale**:  |
| **Grade** | **Marks** | **Grade Point Average** | **Grade Points** |
| A+ | 90-100 | High Distinction | 4.33-5.00 |
| A | 85-89 | Distinction | 4.00-4.27 |
| A- | 80-84 | Distinction | 3.73-3.93 |
| B+ | 75-79 | High Credit | 3.33-3.60 |
| B | 70-74 | Credit | 3.00-3.27 |
| B- | 65-96 | Credit | 2.67-2.93 |
| C+ | 60-64 | Pass | 2.33-2.60 |
| C | 55-59 | Pass | 2.00-2.27 |
| C- | 50-54 | Pass | 1.67-1.93 |
| D+ | 45-49 | Fail | 1.33-1.60 |
| D | 40-44 | Fail | 1.00-1.27 |
| D- | 35-39 | Fail | 0.67-0.93 |
| E | Below 35 | Fail | 0 |
| DNQ | Did Not Qualify: Student received over 50% of total marks but did not meet other specififed conditions for a pass | Fail | 0 |
| CT |  | Credit Transfer | 0 |
| NV |   | Null & Void Dishonest practice | 0 |
| I |   | Result withheld/incomplete assessment | 0 |
| X |   | Continuing course | 0 |
| DNC |   | Did Not Complete | 0 |
| CP |   | Compassionate Pass | 0 |
| Aeg |   | Aegrogat Pass | 0 |
| PT |   | Pass Terminating | 0 |
| P |   | Pass | 0 |
| NP |   | Not Passed | 0 |
| Comp |   | Competent | 0 |
| NComp |   | Not Competent | 0 |
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| **Dissatisfaction with Assessment** |
| The academic conduct of the students is governed by the University Academic and Students Regulation (UASR). All students **must** obtain a copy of the UASR from the FNU academic office and familiarize themselves with all academic matters.  |
| Should a student be dissatisfied with either the internal or external assessment, they can take the following steps to get redress of their grievance.  |
| **Internal Assessment:** The student can refer the work back to the course coordinator for checking and reassessment. Following this reassessment, if the student is still dissatisfied, the student may refer the work to the HOD. The HOD will then appoint another lecturer to examine the work and result will then stand. |
| **Final Exam**: The student can apply for re-check of the grade as per the procedures laid down in the UASR. |
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| **Plagiarism and Dishonest Practice Regulations** |
| Plagiarism is taking another person's words or ideas and using them as if they were your own. It can be either deliberate or accidental. Plagiarism is taken very seriously in higher education. If even a small section of your work is found to have been plagiarised, it is likely that you will be assigned a mark of '0' for that assignment. In more serious cases, it may be necessary for you to repeat the course completely. In some cases, plagiarism may even lead to your expulsion from the university. |
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| **Actions that constitute plagrism**  |
| 1. Downloading and turning in a paper from the Web including a Web page or a paper from an essay writing service. |
| 2. Copying and pasting phrases, sentences, or paragraphs into your paper without showing a quotation and adding proper citation. |
| 3. Paraphrasing or summarising a source’s words or ideas without proper citation. |
| 4. Including a graph, table or picture from a source without proper citation. |
| 5. Getting so much help from a tutor or writing helper that the paper or part of the paper is no longer honestly your own work. |
| 6. Turning in previously written work when that practice is prohibited by your instructor. |