1	Name of Course Module: **Statistics for Humanities and Social Sciences**
2	Course Code:
3	Name(s) of academic staff: Prof. C K Raju
4	**Rationale for the inclusion of the course/module in the programme:** Most students of humanities and social sciences are frightened of quantitative techniques (because of a fear of mathematics). This puts them to a disadvantage since quantitative techniques are increasingly being used in humanities and social sciences, and they are forced to silently accept quantitative arguments (e.g. use of genetic trees in history) as "scientific" without understanding their weaknesses. This is especially relevant for those who do humanities and social sciences in poorer countries, since not only are they under strong pressure to imitate the West but, for example, drug enforcement standards and policies may be much weaker than in the West, so that defective statistical arguments or fabricated data may be easily passed off. As such this course is especially relevant to AIU where many of the students come from poorer countries. Further the use of open source software for statistics would also suit the AIU students who come from a disadvantaged background, and may like to serve their own community. A strong quantitative background, and familiarity with appropriate computer software will help characterize AIU students of humanities and social sciences in obtaining a means of livelihood, since there is a demand for such skills in government, non-government and corporate sectors as well. It will also help them to serve their own community by critically examining statistical arguments in support of various invalid "scientific" claims that may disadvantage their communities.
5	Semester and Year offered:

6	Total Student Learning Time (SLT)	**L**	**T**	**P**	**O**	Total Guided and Independent Learning
	L=Lecture, T=Tutorial, P=Practical O=Others [Projects / Assignments / Consultation / Library Searches / E-learning / Self-study / Independent study / Preparation / Field Work, etc.]	30		6	84	120

7	Credit Value: 03
8	**Prerequisite (if any):** A foundational course in mathematics taught in the same style. Basic familiarity with using computers.
9	Learning outcomes (LOs)*: At the end of the course, students will be able to: LO1: Define the concept of probability, and relate it to empirical risk via relative frequency. Comprehend the "law of large numbers" (without studying measure theory, but with some understanding of the critique why "convergence in measure" cannot be used to define probability as the limit of relative frequency). [C1, C2, C5, A1, A2, A3] LO2: Define random variables, random sampling, pseudo random numbers. Identify the biases of subjective sampling. Distinguish fabricated data from genuine data. [C1, C2, C4, A1, A2, A3, A5] LO3: Apply probability and sampling theory in various fields of humanities and social sciences, such as politics (e.g. election forecasts), economics and business (e.g. market surveys), sociology (e.g. opinion polls, consumption patterns), literature (e.g. word analysis), health care, science, technology and society). Discriminate between valid and invalid applications of sampling theory (e.g. validity of drug or GMO trials etc.)[C3, C4, C6, A5] LO4: Use relevant aspects of the open source software PSPP (and relate it to the proprietary and expensive SPSS software, from IBM) [C3, C4, C6, A2, A4]
	*__Cognitive domain:__ Knowledge [C1], Comprehension [C2], Application [C3], Analysis [C4], Synthesis [C5], Evaluation [C6] *__Affective domain:__ Receiving [A1], Responding [A2], Valuing [A3], Organization [A4], Internalizing [A5]

	*__Psychomotor domain:__ Perception [P1], Set [P2], Guided Response [P3], Mechanism [P4], Complete Overt Response [P5], Adaptation [P6], Organization [P7]
10	Transferable Skills: Students acquire the following: • knowledge of discipline areas • practical skills • problem solving and scientific skills • managerial and entrepreneurial skills • information technology skills
11	Teaching-learning and assessment strategy*:

Learning Outcome	Teaching and Learning Strategy	Assessment Strategy
LO1: Define the concept of probability, and relate it to empirical risk via relative frequency. Comprehend the "law of large numbers" (without studying measure theory, but with some understanding of the critique why "convergence in measure" cannot be used to define probability as the limit of relative frequency).	Lecture Literature Reviews Group discussions Summary Writing [MQA 1,3,4,5,6,7,8; MoHE1,2,3,4,5,6,7]	Assignment Mid-term examination Final Examination
LO2: Define random variables, random sampling, pseudo random numbers. Identify the biases of subjective sampling. Distinguish fabricated data from genuine data.	Lecture Literature Reviews Group discussions Summary Writing [MQA 1,3,4,5,6,7,8; MoHE1,2,3,4,5,6,7]	Assignment Mid-term examination Final Examination
LO3: Apply probability and sampling theory in various fields of humanities and social sciences, such as politics (e.g. election forecasts), economics and business (e.g. market surveys), sociology (e.g. opinion polls, consumption patterns), literature (e.g. word analysis), health care, science, technology and society). Discriminate between valid and invalid applications of sampling theory (e.g. validity of drug or GMO trials etc.)	Lecture Inquiry Reading Internet Search Designing and conducting a toy survey [MQA 1,3,4,5,6,7,8; MoHE1,2,3,4,5,6,7]	Assignment Mid-term examination Final Examination
LO4: Use relevant aspects of the open source software PSPP (and relate it to the proprietary and expensive SPSS software, from IBM)	Practical Internet Search Group Discussions Summary Writing [MQA 1,3,4,5,6,7,8; MoHE1,2,3,4,5,6,7]	Assignment Final Examination

*__MQA Domains of Learning Outcomes:__ Knowledge of Discipline Areas [MQA1], Practical Skills [MQA2], Social Skills & Responsibilities [MQA3], Values, Attitudes & Professionalism [MQA4], Communication, Leadership & Team Skills [MQA5], Problem-solving & Scientific Skills [MQA6], Managerial & Entrepreneurial Skills [MQA7], Information Management & Lifelong Learning Skills [MQA8]

*__MOHE/ LOKI Soft Skill Learning Outcomes:__ Communication Skills [MOHE1], Critical Thinking and Problem solving Skills [LOKI2], Information and Lifelong Learning [MOHE3], Team Work Skills [MOHE4], Entrepreneurial Skills [MOHE5], Values, Ethics and Professionalism [MOHE6], Leadership Skills [MOHE7]

12	Synopsis The course aims to impart quantitative and problem-solving skills related to probability, statistics and sampling theory, using a new approach to computational mathematics and probability which makes it easy. It also aims to teach via open source PSPP software in preference to more usual SPSS.
13	Mode of Delivery: Lecture, Guest Speaker, Internet Search, Literature Reviews, Inquiry Reading, Group Discussion, Discovery Learning, Computer practicals, sampling practicals.
14	Assessment methods and types: Formative Assessment/ Summative Assessment Self-Assessment [SA] / Peer-Assessment [PA] / Lecturer Assessment [LA] Individual Assessment [IA] / Group Assessment [GA]

Method	**LO**	**Type**		**Weight**
Assignment 1	LO1 – LO2	Formative	SA/PA/LA	**15**
Assignment 2	LO3	Formative	SA/PA/LA	**15**
Mid-term Examination	LO1 – LO2	Formative/ Summative	IA/LA	**35**
End Term Examination	LO1 – LO4	Summative	IA/LA	**35**
Total				**100**

17	Content outline of the course/module content and the SLT per topic.						
	Course module topics	**LO**	L=Lecture, T=Tutorial, P=Practical O=Others [Projects / Assignments / Consultation / Library Searches / E-learning / Self-study / Independent study / Preparation / Field Work, etc.]				
			L	**T**	**P**	**O**	**SLT**
	Week 1 Probability and its historical origins in games of chance such as dice and cards, and in sampling theory (e.g. counting leaves on a tree). Permutations and combinations, relative frequency, "law" of large numbers and its limitations. Gambler's ruin.	LO1	3			6	9
	Week 2 Probability and its historical origins in games of chance such as dice and cards, and in sampling theory (e.g. counting leaves on a tree). Permutations and combinations, relative frequency, "law" of large numbers and its limitations. Gambler's ruin.	LO1	3			6	9
	Week 3 Random numbers and variables. Correlation and independence. Independent trials. Histograms and probability distributions. Coin tossing and binomial distribution, normal distributions. Computer experiments to test how it approaches the normal distribution. Poisson distribution: how many people are needed for a good jury?	LO2	3			6	9
	Week 4 Random numbers and variables. Correlation and independence. Independent trials. Histograms and probability distributions. Coin tossing and binomial distribution, normal distributions. Computer experiments to test how it approaches the normal distribution. Poisson distribution: how many people are needed for a good jury?	LO2	3			6	9
	Week 5 Random numbers and variables. Correlation and independence. Independent trials. Histograms and probability distributions. Coin tossing and binomial distribution, normal distributions. Computer experiments to test how it approaches the normal distribution. Poisson distribution: how many people are	LO2	3			6	9

	needed for a good jury?						
	Week 6 Sampling versus census: which is more reliable? Random versus subjective and convenience sampling. Biases of subjective and convenience sampling. Simple random sampling. Estimates for mean and variance. How important is sample size? Generating a random sample. Sample applications of sampling techniques, election forecasts, opinion polls, market surveys, drug trials. Checking the integrity of data. Testing fabrication of data through chi-square tests. Further sources of bias, e.g. perimeter bias, telephonic survey. Using prior knowledge to improve sampling techniques.	LO3	3			6	9
	Week 7: Exam						6
	Week 8 Sampling versus census: which is more reliable? Random versus subjective and convenience sampling. Biases of subjective and convenience sampling. Simple random sampling. Estimates for mean and variance. How important is sample size? Generating a random sample. Sample applications of sampling techniques, election forecasts, opinion polls, market surveys, drug trials. Checking the integrity of data. Testing fabrication of data through chi-square tests. Further sources of bias, e.g. perimeter bias, telephonic survey. Using prior knowledge to improve sampling techniques.	LO3	3			6	9
	Week 9 Sampling versus census: which is more reliable? Random versus subjective and convenience sampling. Biases of subjective and convenience sampling. Simple random sampling. Estimates for mean and variance. How important is sample size? Generating a random sample. Sample applications of sampling techniques, election forecasts, opinion polls, market surveys, drug trials. Checking the integrity of data. Testing fabrication of data through chi-square tests. Further sources of bias, e.g. perimeter bias, telephonic survey. Using prior knowledge to improve sampling techniques.	LO3	3			6	9
	Week 10 Sampling versus census: which is more reliable? Random versus subjective and convenience sampling. Biases of subjective and convenience sampling. Simple random sampling. Estimates for mean and variance. How important is sample size? Generating a	LO3	3			6	9

	random sample. Sample applications of sampling techniques, election forecasts, opinion polls, market surveys, drug trials. Checking the integrity of data. Testing fabrication of data through chi-square tests. Further sources of bias, e.g. perimeter bias, telephonic survey. Using prior knowledge to improve sampling techniques.						
	Sampling toy experiment						8
	Week 11 Designing a questionnaire. Biases introduced through a bad questionnaire ("Have you stopped beating your wife? Answer yes or no.") Techniques of eliciting answers to potentially embarrassing questions. Ethics of questioning. Formulating and testing hypotheses. telephonic survey. Using prior knowledge to improve sampling techniques.	LO3	3			6	9
	Week 12 Introduction to PSPP and related software.	LO4			3	6	9
	Week 13 Introduction to PSPP and related software.	LO4			3	6	9
	Week 14: Exam						6
	Total Hours		**30**		**6**	**84**	**128**
18	Readings selected from the following texts: W. Feller, Probability theory and its applications, vol 1 and 2, Wiley, 1969. C. R. Rao, Statistcs and truth: putting chance to work, 2nd ed., World Scientific, Singapore, 1997 (CSIR lecture). C. K. Raju, "Probability in Ancient India", Elsevier Handbook of Philosophy of Statistics, http://ckraju.net/papers/Probability-in-Ancient-India.pdf. GNU, PSPP manual, http://www.gnu.org/software/pspp/manual/pspp.html. R. Mark Sirkin, Statistics for social sciences, Sage, 2005.						
19	Other additional information: Nil.						