UNIVERSITY OF ENGINEERING AND MANAGEMENT, JAIPUR

Course Description

Title of Course:Processor Architecture for VLSI
Course Code: MVLSI 201
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This This course discusses the basic structure of a digital computer and used for understanding theorganization of various units such as control unit, Arithmetic and Logical unit and Memory unit and I/O unit in adigital computer.

Objectives:

1. To have a thorough understanding of the basic structure and operation of a digital computer.
2. To discuss in detail the operation of the arithmetic unit including the algorithms &implementation of fixed point and floating-point addition, subtraction,multiplication &division.
3. To study in detail the different types of control and the concept of pipelining.
4. To study the hierarchical memory system including cache memories and virtual memory.

Learning Outcomes:

This course provides the foundation education in thebasics of a digital computer and make understanding the organization of various units such as Control unit,Arithmetic and Logical unit, Memory unit and I/O unitin a digital computer.

1. To have a thorough understanding of the basic structure and operation of a digital computer.
2. To discuss in detail the operation of the arithmetic unit including the algorithms &implementation of fixed-point and floating-pointaddition, subtraction, multiplication &division.
3. To study in detail the different types of control and the concept of pipelining.
4. To study the hierarchical memory system including cache memories and virtual memory.

Course Contents:

CPU design

Basic organization of the stored program computer and operation sequence for execution of a program. Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes.

CPU design - Timing and control

Timing diagram and control design, Micro programmed control, Concepts of Micro operations

Pipeline concept

Instruction and Arithmetic Pipelining, data hazards, control hazards and structural hazards, techniques for handling hazards. Pipeline optimization techniques

ALU Design

Restoring Division Algorithm, Non- Restoring division, Multiplier, Different adders.

Superscalar arch: parallel computation, Ways of parallelism, the IBM PowerPC

The DSP and Its Impact on Technology: Why a DSP is different. The evolving architecture of a DSP

VLIW arch: the TI TMS320C6x, advancement to **EPIC**

Coprocessor Approach: Need for accelerators, Accelerators and different types of parallelism, Processor architectures and different approaches to acceleration

Processors using course-grain parallelism: utilization of course-grain parallelism**,** chip-multiprocessors**,** multithreaded processors, SMT proc

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Course Description

Text Books:

1. Computer architecture and parallel processing, Kai Hwang, FayéAlayé Briggs, MGH International edition.
2. Digital Logic and Computer Design, Moris Mano, Prentice Hall
3. Paraami, “Computer Architecture”, Eighth impression, 2 0 1 1, Oxford Press.
4. P.PalChaudhuri, , “Computer organization and design”, 2nd Edition., Prentice Hall of India, 2007.

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Course Description

Title of Course: Digital Signal Processing and Applications
Course Code: MVLSI202
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course examines the concepts of Digital signal processing, filter designing, its architecture and algorithms, and programming of basic signal and system design with filtering. The Topics to be covered (tentatively) include:

- Discrete time signal and system
- Discrete Time Fourier Transform and System response
- Discrete Fourier Transform and Fast Fourier Transform
- Z transform and System analysis
- Filter Design and analysis
- DSP processor
- FPGA

Objectives:

In this course, we will study the basic concepts and techniques for processing signals on a computer, what are the key DSP concepts and how do they relate to real applications. What are the methods of time domain and frequency domain implementation and what are typical characteristics of real DSP systems? How can you use MATLAB to analyze and design DSP systems and how can we use DSP processor and apply it in real life application?

Learning Outcomes:

Knowledge:

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

1. This course will introduce the basic concepts and techniques for processing signals and systems.
2. Provide a deeper understanding of the latest developments in the DSP research area.
3. By the end of the course, you be familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors.
4. The course emphasizes intuitive understanding and practical implementations of the theoretical concepts.
5. Provide students with backgrounds for pursuing independent research in DSP with related applications.

Application:

1. To develop and implement various DSP related system algorithms,
2. To develop, implement, and demonstrate the algorithms of filters,
3. To analysis the real-time signal and system,
4. To implement any kind of circuit on

Course Contents:

Unit 1: Concept of discrete-time signal, basic idea of samplingandreconstructionofsignal,samplingtheorem, sequences–periodic, energy,power,unit-sample, unit-step,unit-ramp,real&complex exponentials, arithmeticoperationsonsequences.

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Unit 2: LTI Systems:
Definition,representation, impulse response,derivationfortheoutputsequence,conceptofconvolution,graphical,analyticalandoverlap-add methodstocomputeconvolutionsupportedwithexamplesandexercises,propertiesofconvolution,interconnectionsofLTIsystemswithphysical interpretations,stabilityandcausalityconditions,recursive and non-recursive systems.

Unit 3: DiscreteFourierTransform:
ConceptandrelationsforDFT/IDFT,Twiddlefactorsandtheirproperties,computationalburdenondirectDFT,DFT/IDFT aslineartransformations,DFT/IDFT matrices,computationofDFT/IDFT bymatrixmethod,multiplicationofDFTs, circular convolution,computationofcircular convolution bygraphical,DFT/IDFT andmatrixmethods,linearfiltering usingDFT,aliasingerror,filteringoflongdatasequences–Overlap-SaveandOverlap- Addmethodswith examples andexercises.

Unit 4:Fast Fourier Transform:
Radix-2algorithm,decimation-in-time,decimation-in-frequencyalgorithms,bit reversal.

Unit 5:Z-Transform:
Definition,mappingbetweens-planeandz-plane,unitcircle,convergenceandROC,propertiesofZ-transform,Z-transformonsequenceswith examplesandexercises, characteristic familiesofsignalsalongwith ROC,convolution,correlationandmultiplicationusingZ-transform,initial value theorem, Perseval'srelation,inverseZ-transformbypartial-fraction expansions with examplesand exercises.

Unit 6:FilterDesign:
BasicconceptsofIIRandFIRfilters,differenceequations,designofButterworthIIRanalogfilterusingimpulseinvariantandbilineartransforms,designof linear phase FIRfilters, no. of taps,rectangular,Hammingand Blackmanwindows**.**

Unit 7:DigitalSignalProcessor:
ElementaryideaaboutthearchitectureandimportantinstructionsetsofTMS320C5416/6713processor, and basic concept of FPGA.

Text Books
1. DigitalSignal Processing – "Digital Signal Processing: A Modern introduction", Ashok Ambardar, Cenage Learning India private limited
2. DigitalSignal Processing – "Principles,AlgorithmsandApplications",J.G.Proakis&D.G.Manolakis, Pearson Ed.
3.TexasInstrumentsDSPProcessor user manualsand application notes.
4. Xilinx FPGAuser manualsandapplication notes.

References
1. DigitalSignalprocessing–AComputer BasedApproach,S.K.Mitra, TMHPublishingCo.
2. DigitalSignal Processing - Signals,Systems andFilters,A.Antoniou,TMH PublishingCo.
3. Digital Signal Processing, A.NagoorKani,TMHEducation
4. DigitalSignal Processing withFieldProgrammableGateArrays,U.Meyer-Baese, Springer

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Course Description

Title of Course:Analog IC Design
Course Code: MVLSI 203
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course will teach design and analysis of analog circuits, in particular, design concepts pertinentto real world applications, with an emphasis on CMOS. It deals with the design and analysis ofCMOS single stage and differential amplifiers at low and high frequencies of operation. This courseintroduces the design of current mirror and CMOS op-amp circuits. It also describes the noiseanalysis of CMOS amplifiers. Circuit performance is predicted by intuition and simple handcalculations, and is verified by computer simulations. The course also involves design projects whichwill be assigned using design software.

Objectives:

1. The Course Educational Objectives are:
2. Impart understanding of working principles and applications CMOS Amplifiers & CMOS Operational Amplifiers in the design of electronic circuits.
3. Provide detail understanding and applications of Switch Capacitor Filters.
4. Provide basic understanding of data converters and its architecture.
5. Provide basic understanding of special CMOS analog circuits.
6. Provide the understanding of RF Analog Circuits & Sub-circuits.
7. Provide the understanding of CMOS comparators.

Learning Outcomes:

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

a) Able to analyze and appreciate the working of electronic amplifiers involving CMOS.
b) Comprehend working of switch capacitor filters.
c) Understand different data converters and its architecture.
d) Understand some special CMOS analog circuits.
e) Design simple RF analog circuits and sub-circuits.
f) Design simple CMOS comparators.
g) Develop simple projects based on the different devices studied in this course.

Course Contents:

Pre-requisites: CMOS models for analog circuits - Small signal equivalent circuit, temperature effect and sensitivity, overview of electrical noise. Analog sub-circuits: CMOS switch, resistors, current source, sink, current mirror, voltage and current references. MOSFET Model ling for Circuit Simulation

1. CMOS Amplifiers & CMOS Operational Amplifiers: Basic concepts ,Performance Parameters,One state OPAMP, Two stage OPAMP, Stability and Phase compensation, Cascode OPAMP,Design of two-stage and Cascode OPAMP, High performanceCMOS OPAMPs, Micro-power OPAMP.

2. Switch Capacitor circuits: General considerations, Switched capacitor, integrators, First and second order switched capacitor filter circuit.

3. Data Converter Fundamentals & Architecture: Ideal D/A converters, Ideal A/D converter, Serial and Flash D/A converters and A/D converters, Medium and High Speed converters, Over-sampling converters, performance limitations, Design consideration.

4. Special CMOS Analog Circuits: CMOS voltage controlled oscillators, Ring oscillators, Phase locked loops with pump phase comparators, G_m-C Circuits.

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5. RF Analog Circuits & Sub-circuits: Capacitors and Inductors in VLSI circuits, Bandwidth estimation techniques, Design of high frequency amplifiers, Design of low noise amplifiers, Design of Mixers of RF power amplifiers, Architectures of receivers and transmitters.

6. CMOS Comparators: Characterization, Two state open loop comparators, Discrete time comparators, High speed comparator circuits, CMOS S/H circuits.

Text Books:

1. "Design of Analog CMOS Integrated Circuits" by B. Razavi (Tata McGraw Hill)
2. "CMOS Analog Circuit Design" by Phillip E. Allen and Douglas R. Holberg (Oxford)
3. "The MOS Transistor" by YannisTsividis (Oxford)

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Course Description

Title of Course:Quantum and Nano Science
Course Code: MVLSI 204
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This This course discusses the quantum and Nano science which consist of quantum & statistical mechanics, quasi low-dimension structure electrical and optical properties of low dimension system, physics of nanostructure and carbon nanotubes.

Objectives:

To take students to the frontiers of knowledge and engineering methods in thefundamental and associated areas of nanotechnology.

Learning Outcomes:

Upon completion of the subject, students will be able to:

1. Demonstrate the understanding of length scales concepts, nanostructures andnanotechnology.
2. Identify the principles of processing, manufacturing and characterization ofnanomaterials and nanostructures.
3. Apply the electronic microscopy, scanning probe microscopy and nanoindentationtechniques to characterize the nanomaterials and nanostructures.
4. Evaluate and analyze the mechanical properties of bulk nanostructured metals andalloys, nanocomposites and carbon nanotubes.

Course Contents:

Quantum & Statistical Mechanics

Wave particle duality and Schr*o*dinger equation, Free and bound particles, Eigen functions, Quantum mechanical operators, Probability current density, Particle in square well potential, Maxwell-Boltzmann statistics, Bose-Einstein and Fermi-Dirac statistics, Concept of phonons.

Quasi Low-Dimensional Structures

Quantum wells, Wires, Dots, Band structure of low-dimensional systems, Quantum confinement, Density-ofstates in 2D, 1D and 0D structures, Heterostructures and bandgap engineering, Modulation doping, Strained layer structures.

Electrical and Optical Properties of Low-Dimensional Systems

Infinitely deep square wells, Wells of finite depth, Parabolic wells, Superlattices; Scattering mechanisms, Mobility enhancement, tunneling in heterostructures, Quantum Hall effect, Optical absorption in quantum wells: Intersubband transitions, Quantum well laser, Resonant tunneling.

Physics of Nanostructure Devices

Single electron transistors: Coulomb block phenomenon, Fabrication and applications, Memory devices, Quantum computer, Spintronic, Molecular electronic devices.

Carbon Nanotubes

Types of nanotubes and their formation, Properties of nanotubes, Uses in nanoelectronics, Carbon nanotube
transistors, Future prospect.

Text Books:

1. " Quantum Heterostructure – Microelectronics and Optoelectronics" by V.V. Mitin, V.A. Kochelap andM.A . Stroscio (Cambridge Univ Press, 1999).
2. "The Physics of Low Dimensional Semiconductors – An Introduction" by John H. Davies CambridgeUniversity Press, 1998

3. "Physics of Semiconductors and Their Heterostructures" by Jasprit Singh.
4. "Quantum Wells, Wires, and Dots" by P.HarrisonChichester: (Wiley 2000)
5. "Nanotechnology" by M. Wilson, K. Kannangara, G..Smith, M..Simmons, and B. Ragus (Overseas Press,2005)

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Course Description

Title of Course:Mobile Communication
Course Code: MVLSI 205
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

Wireless communications have become essential part in our day to day life.During recent years, there has been significant improvement in the field ofwireless communication technology and has rapidly evolved from firstgeneration (1G) to fourth generation (4G). The rapid growth of cellular phones,which principle carry voice are now being widely used for communicating dataand images. The communication aspects of this subject depend on thefundamentals of communication engineering. To understand this technology, it isimportant to know in detail, a number of concepts associated with cellularmobile communication.

Objectives:

1. To have an overview of wireless and mobile communications in different generations.
2. To study the operation of basic cellular system and performance criterion, handoffmechanism.
3. To study the design of cellular mobile system.
4. To develop the ability to search, select, organize and present information on newtechnologies in mobile and cellular communications.

Learning Outcomes:

1. 1. Students are capable to analyze and solve problems in the field of telecommunications.
2. Students will have the understanding of different generations, operations and design ofwireless and mobile communications

Course Contents:

Introduction - evolution of mobile radio communications, mobile radio systems around the world, trends in cellular radio and personal communication, first generation (1G), second generation (2G), third generation (3G) mobile cellular networks.

Cellular concept – Limitations of conventional mobile system, Introduction to mobile cellular communication, concept of frequency reuse, cluster size, cellular system architecture, channel assignment strategies, call handoff strategies - hard handoff and soft handoff, prioritizing handoff; interference and system capacity, improving capacity in cellular systems – cell splitting, sectoring, microcell zone concept.

Different mobile communication systems – GSM services and features, system architecture, GSM radio subsystem, GSM channel types, location updating and call setup, WAP, SCSD, GPRS, EDGE, 3G W-CDMA; CDMA digital cellular standard, comparison between GSM and CDMA, 3G cdma2000, IMT-2000.

Radio Channel Characterization – Free space propagation, Multipath propagation, diversity techniques, Co-channel interference, Propagation effects - scattering, ground reflection, fading, Log-normal shadowing.

Wireless networks – Advantages and applications of Wireless LAN, WLAN technology – RF and IR wireless LAN, diffuse, quasi-diffuse and point-topoint IR wireless LAN, IEEE802.11, IEEE802.11 architecture, Physical layer, MAC layer, Introduction to WI-FI, HIPERLAN2, Bluetooth – Bluetooth architecture.

Mobile network and transport layer – Introduction to Mobile IP, requirements, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimization, Reverse tunneling; Mobile adhoc networks – Routing, Destination sequence distance vector, Dynamic source routing and Alternative metrics; Traditional TCP – Congestion control, Slow start, Fast retransmit / fast recovery, Implications of mobility; classical TCP improvements – Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit. --10L Future of mobile communication – 3G to 4G.

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Course Description

Text Books:

1. Theodore S. Rappaport, Wireless communications: principles and practice, PHI / Pearson education.
2. J. Schiller, Mobile communications, Addison-Wesley.
3. William C. Y. Lee, Mobile cellular telecommunication – analog and digital systems, McGraw Hill, 2nd ed.
4. Wang, Wireless communication System, Pearson Education
5. Talukdar, Mobile computing, TMH
6. J.W.Mark, W. Zhuang, Wireless Communication and Networking, PHI

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Course Description

Title of Course: Embedded system Lab-I
Course Code: MVLSI-192
L-T-P scheme: 0-0-3 **Course Credit: 4**

Objectives:

An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a kind of application device. Industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines, and toys (as well as the more obvious cellular phone and PDA) are among the myriad possible hosts of an embedded system. Embedded systems that are programmable are provided with a programming interface, and embedded systems programming is a specialized occupation. Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

Learning Outcomes: The students will have a detailed knowledge of the concepts ofmicrocontroller and microcontroller based system and students also study the new language like embedded C. Upon the completion of this practical course, the student will be able to:

- **Understand** and implement basic program of embedded C language.
- **Use** the new processor and synchronization libraries in software/ hardware interfaces**.**
- **Study**the benefits to use microcontroller in our real life.
- **Analyze** and simulate the various program.
- **Interface**various hardware interface with 8051 microcontroller.
- **Simulate** the application based program in proteus environment.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Write an assembly language program to add, subtract, multiply, divide 16 bit data by Atmel microcontroller.
Exercise No. 2: Write an assembly language program to generate 10 KHz frequency using 8051.
Exercise No. 3: To study the implementation & interfacing of LCD using 8051 microcontroller
Exercise No. 4: To study implementation & interfacing of LED
Exercise No. 5: To study implementation & interfacing of seven segment display
Exercise No. 6: To study implementation & interfacing stepper motor with 8051 microcontroller
Exercise No. 7: To study implementation & interfacing of relay with 8051 microcontroller
Exercise No. 8: To study implementation & interfacing of keypad with 8051 microcontroller
Exercise No. 9: Study of implementation of DC Motor control using PWM method.
Exercise No. 10: Study and observation of Position control of Servo Motor

Text Book:

1. Muhammad Ali Mazidi, J.G. Mazidi, R.D.McKinlay,The 8051 Microcontroller and Embedded Systems, Pearson Prentice Hall.

Recommended Systems/Software Requirements:

Minimum system requirement: -

Processor	:	AMD Athlon ™ 1.67 GH_z
RAM	:	256 MB
Hard Disk	:	40 GB
Mouse	:	Optical Mouse

Hardware requirement: - Microcontroller kit, Interfacing kit, SMPS for microcontroller, Microcontroller burner, Microcontroller AT89C51, etc.

Software requirement: - Windows 2007/8/10, keil simulator, ect.

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Course Description

Title of Course: Grand Viva **Course Code: MVLSI281**
L-T –P Scheme: 0-0-0 **Course Credits: 4**

Aims and Objectives

1. To compare the traditional viva examination (TVE) with OSVE (Objective Structured Viva Examination).

2. To obtain the students' opinion regarding OSVE as an assessment tool.

3. A suggestion to include OSVE as a part of university examination.

Materials and Methods

The study was carried out in November 2012, at K.J. Somaiya Medical College, in the department of Anatomy. 50 students were exposed to different stations of viva as well as OSVE. A comparison was made of the student's performance and a feedback was taken from the students regarding the same.

As the OSVE was being conducted for the first time, the students were notified in advance regarding the plan for conducting the part ending practical assessment – by both the TVE and OSVE. The OSVE was planned for 20 marks, viva voce of 20 marks.

Purpose and Format of the Viva Voce Examination

Literally, "viva voce" means by or with the living voice - i.e., by word of mouth as opposed to writing. So the viva examination is where you will give a verbal defence of your thesis.

Put simply, you should think of it as a verbal counterpart to your written thesis. Your thesis demonstrates your skill at presenting your research in writing. In the viva examination, you will demonstrate your ability to participate in academic discussion with research colleagues.

Purpose of the Exam

The purpose of the viva examination is to:

- demonstrate that the thesis is your own work
- confirm that you understand what you have written and can defend it verbally
- investigate your awareness of where your original work sits in relation to the wider research field
- establish whether the thesis is of sufficiently high standard to merit the award of the degree for which it is submitted

- allow you to clarify and develop the written thesis in response to the examiners' questions

The Examiners and Exam Chair

You will normally have two examiners:

- an internal examiner who will be a member of academic staff of the University, usually from your School/Department but not one of your supervisors
- an external examiner who will normally be a member of academic staff of another institution or occasionally a professional in another field with expertise in your area of research (candidates who are also members of University staff will normally have two external examiners in place of an internal and an external examiner)

Your supervisor should let you know who your examiners will be as it is important that you ensure you are familiar with their work and any particular approach that they may take when examining your thesis.

In some cases there may also be a Chair person for the examination. A Chair is appointed if the Graduate Dean or either of the examiners feels this is appropriate, for example where the examining team has relatively little experience of examining UK research degrees. The Chair is there to ensure the examination is conducted in line with University regulations and is not there to examine your thesis. If there is a Chair person, it will usually be a senior member of the academic staff of your School/Department.

Normally no one else is present in the exam.

Exam Venue and Arrangements

Your internal examiner is responsible for arranging your viva exam and they will contact you with the relevant details - date, time, venue, etc.

Usually the viva exam will take place in your School/Department, though occasionally another University location may be used. If you are unsure where you need to go, make sure you check this before the day of your exam.

If you returned your Notice of Intention to Submit Your Thesis three months before your submission date, your viva exam should normally take place quite soon after submission. Almost

all viva exams take place within three months of thesis submission and in many cases it is within one month.

Format of the Exam

All viva examinations are different, so it is not possible to describe exactly what will happen - but there are general points which can be made which may be helpful, and you should have the opportunity before your examination to discuss what will happen with your supervisor or to attend the University's pre-viva examination workshop.

The purpose of the viva is to establish that your work is of a sufficiently high standard to merit the award of the degree for which it is submitted. In order to be awarded a research degree, the thesis should demonstrate an original contribution to knowledge and contain work which is deemed worthy of publication.

In order to do this, examiners may:

- ask you to justify your arguments
- ask you to justify not only things which you have included in your thesis but also things which you may have left out
- ask you questions about the wider research context in which the work has been undertaken
- argue certain points with you
- expect you to discuss any developments which may flow from your work in the future

Inevitably, your thesis will have strengths and weaknesses and the examiners will want to discuss these. It is considered a positive thing, indeed an essential thing, that you can discuss both the strengths and the weaknesses. You can think of the weaknesses as an opportunity to demonstrate your skill at critical appraisal.

Remember that examiners seek to find and discuss weaknesses in all theses - you should not interpret criticism as an indication that the examination will not end successfully.

UNIVERSITY OF ENGINEERING AND MANAGEMENT, JAIPUR

Course Description

Title of Course: Seminar
Course Code: MVLSI282
L-T-P scheme: 0-2-0 **Course Credit: 1**

The overall aim of the seminar series is to help develop an emerging field at the intersection of multi-disciplinary understandings of culture and education. It will build on the existing body of work on education and culture, but its aim is explore and develop new perspectives in this area.
The objectives of the six exploratory seminars are:

- **to explore new research from a range of academic disciplines which sheds light on the questions outlined above**
- **to showcase cutting edge research on education and culture from outstanding academic researchers from the UK and internationally**
- **to bring together seminar participants from different disciplines such as Sociology, Philosophy, Psychology, Human Geography, Media Studies as well as Education and Cultural Studies**
- **to encourage and financially support the participation of PhD students**
- **to actively involve practitioners and users from each venue**
- **to engage a core group of policy makers**
- **to use the seminars to develop links between academics and stakeholders in the arts, library, media, community and educational sectors**