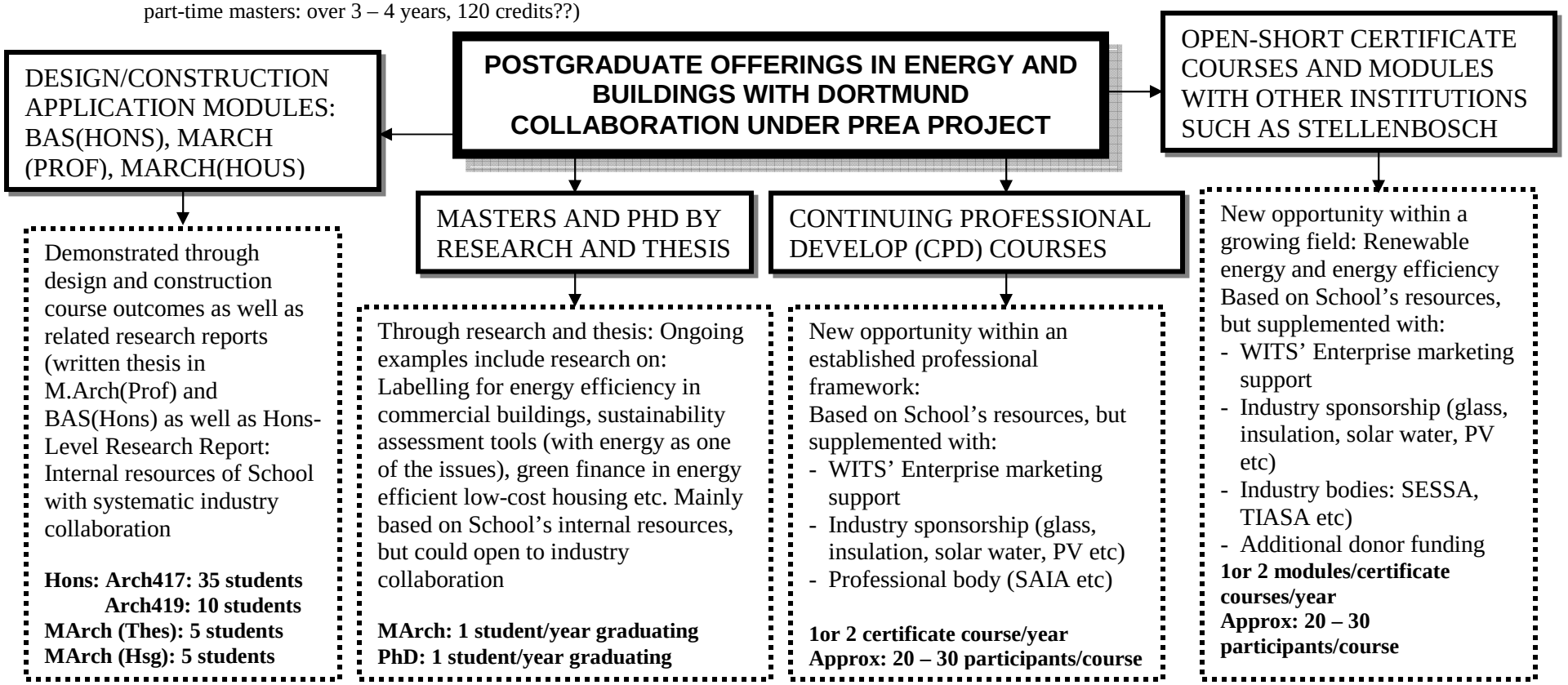
PREA PROJECT: POSTGRADUATE IN ENERGY AND BUILT ENVIRONMENT AT WITS

It is proposed that the PREA Project at WITS be based on deepening the understanding of energy and buildings for built environment professionals both through the University as well as through external certificate courses. This will have the advantage of both enlarging the demand/uptake of the course as well as generating additional income for the School of Architecture and Planning. In this regard, a four-pronged approach is proposed as shown in the diagram below:

- Design/construction application sub-modules into existing postgraduate courses architecture and housing: ***YEAR 1 – Kick-off and sustain into subsequent years*** (SEM 1:Eskom-lamp competition, Energy in use/embodied energy seminars. SEM 2: ARCH419 research elective, etc)
- Masters and PhD by research and thesis: ***YEAR 1 – Kick-off and sustain into subsequent years***
- Professional-route under Continuing Professional Development (CPD - mainly architects): ***YEAR 1/2 – Kick-off and sustain into subsequent years*** (Accumulated credits + Research Report could lead to a part-time masters: over 3 – 4 years, 120 credits??)
- Open-route short certificate courses (open to those with bachelors and honors degrees: focus on those in built environment disciplines/professions): ***YEAR 1/2 – Kick-off and sustain into subsequent years*** (Accumulated credits + Research Report could lead to a part-time masters: over 3 – 4 years, 120 credits??)



PREA PROJECT: POSTGRADUATE IN ENERGY AND BUILT ENVIRONMENT AT WITS
A BROAD SCOPING OF CONTENT FOR COURSES AND MODULES

KEY THEMES/AREAS	SUB-THEMES/AREAS	COMMENTS
THERMAL COMFORT AND PASSIVE THERMAL CONTROL	1) Thermal comfort analysis and requirements	Façade design for passive thermal control, integration to renewable energy such as PVs
	2) Climatic analysis (principles, data and tools)	
	3) Heat flow and design interventions (principles, applications and performance assessment)	
	4) Simulations and evaluations (principles, tools and applications)	
ACTIVE THERMAL CONTROL AND ENERGY EFFICIENCY	1) Hybrid systems: principles and design parameters (assessing the potential and options)	System design and optimisation (simulation), integration with renewables (solar water heating), monitoring
	2) Mainly passive with minor active system	
	3) Mainly active with minor passive	
	4) Fully active	
	5) Indoor air-quality: Principles, monitoring and regulation	
LIGHTING AND DAYLIGHTING	1) Daylighting: Resource evaluation (availability, quality, quantity, measurements etc)	Façade design for daylighting/hybrid, integration to renewable energy such as PVs
	2) Design (tools and evaluation) for optimisation	
	3) Technical interventions (glazing, films and their applications)	
	4) Hybrid (Daylight and artificial): Technical interventions, simulations	
	5) Artificial lighting and energy efficiency: Lamps and luminaire	
EMBODIED ENERGY	1) Principles and derivation methods	
	2) Application (design and material-choice implications: Life-cycle appraisals)	
	3) Design assessment, evaluations and comparative frameworks	
RENEWABLE ENERGY TECHNOLOGIES IN BUILDINGS AND SETTLEMENTS	1) Principles and resource assessment	
	2) Solar water heating (principles, technological options, system sizing and integration etc)	
	3) Photovoltaics - PV (principles, technological options, system sizing and integration etc)	
	4) Wind energy (principles, technological options, system sizing and integration etc)	
	5) Bio-fuels and fuel cells (principles, technological options, system sizing and integration etc)	
ENERGY PLANNING, POLICY AND FINANCE (MACRO-SCALE PERSPECTIVES)	1) Energy resource and supply options (local, regional, national, global)	
	2) Energy, lifestyles and eco-footprint (impacts and externality costs)	
	3) Fossil fuels, greenhouse gases and climate change/global warming	
	4) Energy mix in an economy and across sectors (grid, micro-grid, IPP, feed-tariffs etc)	
	5) Energy and socio-economic development (job creation, empowerment, gender-equity etc)	
	6) Building regulations and rating/labelling for energy efficiency	
	7) Green-finance for renewable energy and energy efficiency	

ENERGY EFFICIENT CITIES STUDIES

UNIVERSITY OF THE WITWATERSRAND (WITS)
SCHOOL OF ARCHITECTURE AND PLANNING
FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

CURRICULUM FOR A PROPOSED POST-GRADUATE DIPLOMA (WITH OPTION FOR HONS, MASTERS AND PHD)

CONVENOR: DR. DANIEL K. IRURAH

NOTE: To be offered as CPD/Short-Certificate Courses in 2009 and as Postgraduate Diploma qualification as from 2010.

AIM
In context of South Africa, Africa and developing countries in general, provide an understanding of built environment (cities, settlements, buildings and housing) as the core within which most of our energy resources are consumed, resultant environmental impacts generated and potential for mitigation and adaptation interventions is highest.

SCOPE
The proposed qualification will be inter-disciplinary programme to be offered in context of case-study appraisals but recognising the broad spectrum of issues from the macro-scale to micro-level issues as well as the policy/legislation and technical dimensions of the subject.

BASIC OUTCOME AND ANTICIPATED CAREER AREAS OF GRADUATES
Graduates of this programme are expected to be working in a diverse range of careers within the fast-evolving renewable and sustainable energy sector. In particular, we anticipate them to be working as entrepreneurs/innovators or employees in municipalities, financial/investment institutions, professional practices/consultancies, property development companies, NGOs, CBOs, research/academic institutions, policy/legislation bodies etc. Graduates should therefore develop basic skills that allow them to meaningfully participate in the contemporary energy-and-built environment dynamics and debate both in the drivers, challenges and solutions dimensions.

KEY COMPONENTS: Based primarily on consolidating theory and principles through case-study appraisal approach (complemented with field trips or/and guest-specialist lectures), the programme will guide the students towards:

Understanding the socio-economic and environmental challenges of our legacy energy systems based on fossil fuels (those who can afford) and biomass (mainly for the poor in rural areas)

Understanding the intricate dynamics of energy and built environment at different scales (commuting/transport, energy and urban form, energy and production of construction materials and buildings, energy and operation of buildings - commercial and residential)

Understanding the mitigation and adaptation interventions at macro and micro-scale: mitigation and adaptation at city-form and urban/settlement design/planning, production/supply of alternative construction materials, building design, detailed design and specifications, operation and demolition/disposal (cradle-to-cradle as opposed to cradle-to-grave value system).

Understanding the evolving policy/legislation (local, national, regional and global) as well as emerging business/job-creation opportunities at different scales from SMMEs to multi-nationals in renewable and sustainable energy.

WHO SHOULD ATTEND

This qualification is of key relevance to built-environment professionals (architects/landscape-architects, engineers, urban planners/designers, quantity surveyors and construction managers) as well as 21st-century property-developers/financiers and investors, public-sector policy-makers (including urban policy-planners), manufacturers/suppliers of EE and RE technologies for the built environment, as well as NGO/CBO-personnel working in the field of sustainable livelihoods, communities and cities. Professionals/consultants working for or running ESCOs (Energy Services Companies) will find the course invaluable for additional dimension to their consulting work.

ADMISSION AND PREVIOUS QUALIFICATION/EXPERIENCE

Admission will initially be into a Post-graduate Diploma and will be open to students with a strong academic background either at bachelors, honors, masters or PhD qualification in any discipline. However, priority will be given to those with built environment qualifications and related experience (architecture, engineering, urban planning/design, construction management, quantity surveying or landscape architecture). The main body of the content will be offered in taught-modules (with associated assignments/projects) at a Postgraduate Diploma level which will serve as a stand-alone qualification.

There will be 6-taught modules of 25-Credits each leading to a total of 150-Credits for the diploma qualification. Upon a diploma-qualification, students may opt to pursue a further qualification (honors, masters or PhD) in this field depending on their qualification at time of admission. This will be based on the completion of a Research Report (honors and/or masters qualification) or Dissertation/Thesis (PhD) in this field. For admission to such a higher qualification applicants will be required to have attained an average of at least 65% in their diploma qualification.

Students will also have the option of enrolling in the modules as occasional/part-time students for short certificate courses whose credits can be banked towards the intended qualification once all the requirements have been met provided this is achieved within the maximum stipulated period by the university.

TRANSFER OF CREDITS

Where a student can clearly demonstrate that they have taken an equivalent taught-module in terms of content/scope and level (at honors, masters or PhD) within the last 3-years maximum, they can apply for exemption and recognition of the credits towards their qualification requirements provided such credits will not be more than 50% of the qualification requirements for the post-graduate diploma. No such credits will be recognised in relation to research-report, project/dissertation or thesis for the higher qualification beyond the diploma.

TAUGHT MODULES
The six taught modules and their course-codes will be as follows:

- **ARPLXXXX: 25-CREDITS: Energy efficient cities**
- **ARPLXXXX: 25-CREDITS: Energy economics, policies/programmes, institutional structures and markets**
- **ARPLXXXX: 25 CREDITS: Energy efficiency through systems-integration and resource efficiency**
- **ARPLXXXX: 25 CREDITS: Building and settlement integrated renewable energy systems**
- **ARPLXXXX: 25 CREDITS: Energy efficiency in architecture and housing**
- **ARPLXXXX: 25 CREDITS: Energy efficiency retrofit in existing buildings and operations**

ARPLXXXX: RESEARCH REPORT, PROJECT/DISSERTATION AND THESIS TOWARDS HONS, MASTERS AND PHD QUALIFICATION
For students with a 3-year Bachelors degree, addition of a Research Project in EE and RE (not more than 6-months full-time duration: 120 Credits) will lead to an Honours qualification. For students with an Honours qualification, addition of a Research Project/Dissertation in EE and RE (minimum 1-year full-time: 180-credits equivalent) will lead to a Masters qualification. For students with a masters qualification, addition of a thesis in EE and RE (minimum 2-years – full-time: 360 Credits) will lead to a PhD qualification.

METHOD OF DELIVERY
All the six modules will be delivered through an in-session 1-week block (6-days) from Monday to Saturday. The block for each module will be preceded by pre-session readings and appraisal (self-study) and followed by post-session assignment/mini-research mainly based on secondary sources/literature-appraisal (self-study). The key pedagogic goals and the main delivery (teaching/learning) methods are shown in the schedule overleaf.

VENUE, DATE, TIME, COST AND REGISTRATION PROCEDURE
The dates, venue, cost and registration procedure for the Diploma will be announced by mid 2009 for admission and registration in 2010. Dates, Venue, Cost and Registration procedure for the CPD/Short-Courses in 2009 will be announced in early 2009.

EVALUATION
In order to qualify for the Diploma, a student must pass each module by a minimum of 50%. Each module will be assessed according to the following categories of performance and weighting:

- **25%:** Pre-session readings: critique/appraisal of at least 2-readings per day's topic
- **10%:** In-session attendance, participation and journal (attendance -5%, Journal – 5%)
- **5%:** In-session Test (done in the course of the week – Days 3, 4 or 5)

- **25%:** In-session group project: Preparation and presentation on Day 6
- **50%:** Post-session assignment/mini-research submitted not later than 2-months after the in-session

CONTACT DETAILS AND ENQUIRIES

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ENERGY EFFICIENT CITIES STUDIES

UNIVERSITY OF THE WITWATERSRAND (WITS)

SCHOOL OF ARCHITECTURE AND PLANNING

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SHORT CERTIFICATE-COURSE-1 (MODULE-1)

ENERGY EFFICIENT CITIES

25-CREDITS 6 DAYS

CONVENOR: Dr. Daniel K. Irurah
School of Architecture and Planning

Overview

As one of the leading end-users of delivered energy, the built environment makes a major contribution to resource and environmental impacts of energy production and consumption in modern economies. The energy end-uses fall into three major categories as follows:

- Energy in operation/use of buildings
- Energy in production of construction materials, construction and demolition
- Energy in the access to built facilities (transport/commuting)

The sector also provides major opportunities in energy efficiency and renewable energy interventions with critical socio-economic and environmental benefits.

In context of developing countries, participants in this course (module) will gain inter-disciplinary skills that allow them to participate in the energy-and-built environment discourse both in the “challenges-” and “solutions-” dimensions.

KEY COMPONENTS

Based primarily on a case-study approach (complemented with field trips and guest-specialist lectures) the module (course will guide the participants towards:

- Understanding the socio-economic and environmental challenges of our legacy energy systems based on fossil fuels (those who can afford) and biomass (mainly for the poor in rural areas)
- Understanding the intricate dynamics of energy and built environment at different scales (commuting/transport, energy and urban form, energy and production of construction materials and buildings, energy and operation of buildings - commercial and residential)
- Understanding the mitigation and adaptation interventions at macro and micro-scale: mitigation and adaptation at city-form and urban/settlement design/planning, production/supply of alternative construction materials, building design, detailed design and specifications, operation and demolition/disposal (cradle-to-cradle as opposed to cradle-to-grave value system)
- Understanding the evolving policy/legislation (local, national, regional and global) as well as emerging business/job-creation opportunities at different scales from SMMEs to multi-nationals in renewable and sustainable energy.

SCOPE AND OVERALL METHOD: This is primarily a ***broad-picture*** course (module) to be offered through case-study appraisals/presentations, seminar discussions based on prior readings, field trips and related assignments. The module (course) aims to address the broad spectrum of related issues from the macro-scale to micro-level issues as well as the policy/legislation and technical dimensions of the subject. It will be offered as the entry/bridging module (course) which will form the base for the more focused and specialised modules (courses) aimed at increasing depth of understanding and competence in this emerging field.

CRITICAL OUTCOMES OF THE MODULE (COURSE)

On successful completion of the module (course) participants in this module (course) are likely to be working in a diverse range of careers within the fast-emerging sector of renewable and sustainable energy. In particular, they are likely to be working as entrepreneurs/innovators or employees in municipalities, financial/investment institutions, professional practices/consultancies, property development companies, NGOs, CBOs, research/academic institutions and policy/legislation bodies among others. On successful completion of the module (course) participants will be able to:

- explain the nexus/coupling of energy and the city/built-environment and related resource/environmental implications
- conceptualise and analyse intervention strategies (mitigation and adaptation) strategies with goals, targets and indicators) at macro- and micro-scale of the built environment spectrum
- conceptualise and analyse socio-economic outcomes (goals and targets) linked to EE and RE interventions in the built environment
- conceptualise and analyse relevant policy and institutional frameworks (transitional-mechanisms) for the interventions

CERTIFICATION

This is a Level-7/8 course (module). A Certificate of Attendance with an indication of the CPD points and level will be awarded to all participants. Participants who complete and submit all assessment requirements (attendance, presentations, assignments etc) successfully will be awarded a Certificate of Competence. This will allow the participant to bank credits in this module (course) towards the Postgraduate Diploma Qualification once it is approved and launched at Wits.

WHO SHOULD ATTEND

The course (module) is of key relevance to built-environment professionals (architects/landscape-architects, engineers, urban planners/designers, quantity surveyors and construction managers) as well as 21st-century property-developers/financiers and investors, public-sector policy-makers (including urban policy-planners), manufacturers/suppliers of EE and RE technologies for the built environment, as well as NGO/CBO-personnel working in the field of sustainable livelihoods, communities and cities. Professionals/consultants working for or running ESCOs (Energy Services Companies) will find the course invaluable for additional dimension to their consulting work.

VENUE, DATE, TIME, COST AND REGISTRATION PROCEDURE

This will be a 1-week (6-days) module (course). The dates, venue, cost and registration procedure for the module will be announced early 2009.

PREVIOUS QUALIFICATION/EXPERIENCE

Although the course (module) is aimed at holders of a bachelors-degree as a minimum requirement, those with a keen interest in this field and a relevant working experience will be considered for both participation and competence certificates. However, such "differently-qualified" participants will not be able to bank the credits towards the postgraduate qualification unless successful evaluation of "prior-learning" has been completed for the participant prior to enrolling in the course (module).

WEEK-PROGRAMME OVERVIEW

DAY-1

- Context: global and local energy challenges (principles, benchmarks/indicators including carbon- and eco-footprint)

DAY-2

- City-scale challenges and interventions (overview on urban-form, density and commuting)

DAY-3

- Building-scale challenges and interventions (overview on EE and RE for buildings)

DAY-4

- Leadership/innovation and eco-entrepreneurship in EE and RE

DAY-5

- Programme/project management in EE and RE (including research methods overview and project management principles)

DAY-6

WEEK-ASSIGNMENT/PROJECT PRESENTATION, ASSESSMENT AND MODULE EVLAUATION

CONTACT DETAILS AND ENQUIRIES

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ENERGY EFFICIENT CITIES STUDIES

UNIVERSITY OF THE WITWATERSRAND (WITS)

SCHOOL OF ARCHITECTURE AND PLANNING

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SHORT CERTIFICATE-COURSE-2 (MODULE-2)

ECONOMICS, POLICIES AND MARKETS FOR EE AND RE

25-CREDITS, 6 DAYS

CONVENOR: Dr. Daniel K. Irurah
School of Architecture and Planning

OVERVIEW OF MODULE

The transition from the prevailing unsustainable energy mix to the energy efficient cities (with a higher role for EE and RE) will rely heavily on transformed policy and market drivers in the energy field in general but also in the various end-use sectors such as cities and buildings. The transformation of the policies and markets therefore requires skills and competencies in the EE and RE fields. This module aims at facilitating participants in the development of the required skills which would allow them to make meaningful/relevant contribution in the policy transition.

AIM AND SCOPE

The module (course) will develop skills/competencies in analytical, integrative and consultative/participatory strategies in policy/programme formulation to catalyse the transition to the desired EE and RE markets and related targets/indicators at local, national and global level. Although the focus of the module will be on EE and RE policies/programmes related to cities and built environment, reference to the more general energy field will be covered. Equally, the supportive institutional structures for the policies/programmes will also be covered.

KEY COMPONENTS

The module will be based primarily on a case-study approach (complemented with field trips and guest-specialist lectures) the module (course) will cover the following key components:

- Prevailing energy-mix and environmental/resource limits
- Energy poverty, equity and safety/health impacts
- Futures studies and scenario-mapping for energy policy planning (including targets and indicator formulation)
- Consultative strategies and methods in policy planning (including targets/indicator interrogation and adoption)
- Integrated energy planning and modelling (with supply- and demand-side options)
- Economic and feasibility appraisal tools in EE and RE projects and programmes (CBA, IRR etc)
- Legislative, fiscal and institutional mechanism/tools for market transition to EE and RE (includes feed-in tariffs, carbon-tax/subsidies, EE and RE by-laws, building regulations etc)
- Investment, entrepreneurship and green-finance (including CDM and carbon trading) for EE and RE

- Monitoring, evaluation and reporting (MER) in EE and RE projects, policies and programmes

SCOPE AND OVERALL METHOD
This is primarily a specialised module (course) which will rely heavily on case studies and presentations by specialist guest-presenters for the various topics.

CRITICAL OUTCOMES OF THE MODULE (COURSE)
On successful completion of the module (course) participants will be able to:

- Appraise (qualitatively and quantitatively) the prevailing energy mix (locally, nationally and globally) and its key challenges (environmental/resource limits, security, equity and poverty imbalances)
- Appraise (qualitatively and quantitatively) market trends in EE and RE in the energy mix and related technological diffusion and cost trends
- Apply stakeholder consultative and future-studies methods/strategies to evolve the desired transition pathways towards an enhanced role of EE and RE in the energy mix locally, nationally and globally
- Guide, facilitate and support the formulation, implementation and monitoring of policies, programmes and institutional mechanisms in support of the transition pathways for EE and RE, with a focus on energy efficient cities.

CERTIFICATION
This is a Level-7/8 course (module). A Certificate of Attendance with an indication of the CPD points and level will be awarded to all participants. Participants who complete and submit all assessment requirements (attendance, presentations, assignments etc) successfully will be awarded a Certificate of Competence. This will allow the participant to bank credits in this module (course) towards the Postgraduate Diploma Qualification once it is approved and launched at Wits.

WHO SHOULD ATTEND
The course (module) is of key relevance to built-environment professionals (architects/landscape-architects, engineers, urban planners/designers, quantity surveyors and construction managers) as well as 21st-century property-developers/financiers and investors, public-sector policy-makers (including urban policy-planners), manufacturers/suppliers of EE and RE technologies for the built environment, as well as NGO/CBO-personnel working in the field of sustainable livelihoods, communities and cities. Professionals/consultants working for or running ESCOs (Energy Services Companies) will find the course invaluable for additional dimension to their consulting work.

VENUE, DATE, TIME, COST AND REGISTRATION PROCEDURE
This will be a 1-week (6-days) module (course). The dates, venue, cost and registration procedure for the module will be announced early 2009.

PREVIOUS QUALIFICATION/EXPERIENCE
Although the course (module) is aimed at holders of a bachelors-degree as a minimum requirement, those with a keen interest in this field and a relevant working experience will be

considered for both participation and competence certificates. However, such “differently-qualified” participants will not be able to bank the credits towards the postgraduate qualification unless successful evaluation of “prior-learning” has been completed for the participant prior to enrolling in the course (module).

WEEK-PROGRAMME OVERVIEW

DAY-1

- Prevailing energy-mix and environmental/resource limits (including trends and indicators)
- Energy poverty, equity and safety/health impacts (including trends and indicators)

DAY-2

- Futures studies and scenario-mapping for energy policy planning (including targets and indicator formulation)
- Consultative strategies and methods in policy planning (including targets/indicator interrogation and adoption)

DAY-3

- Integrated energy planning and modelling (with supply- and demand-side options)
- Economic and feasibility appraisal tools in EE and RE projects and programmes (CBA, IRR etc)

DAY-4

- Legislative, fiscal and institutional mechanism/tools for market transition to EE and RE (includes feed-in tariffs, carbon-tax/subsidies, EE and RE by-laws, building regulations etc)
- Investment, entrepreneurship and green-finance (including CDM and carbon trading) for EE and RE

DAY-5

- Monitoring, evaluation and reporting (MER) in EE and RE projects, policies and programmes

DAY-6

WEEK-ASSIGNMENT/PROJECT PRESENTATION, ASSESSMENT AND MODULE EVLAUATION

CONTACT DETAILS AND ENQUIRIES

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ENERGY EFFICIENT CITIES STUDIES

UNIVERSITY OF THE WITWATERSRAND (WITS)

SCHOOL OF ARCHITECTURE AND PLANNING

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SHORT CERTIFICATE-COURSE-3 (MODULE-3)

EE AND RE THROUGH URBAN SYSTEMS INTEGRATION

25-CREDITS, 6-DAYS

CONVENOR: Dr. Daniel K. Irurah
School of Architecture and Planning

OVERVIEW OF MODULE

Over 50% of humanity now lives in cities thus making the city one of the most critical “levers” in the transition to a greater role for energy efficiency and renewable energy in our energy mix. The pattern and structure of urban development as well as the choices in infrastructure and services options are some of the key ways in which cities influence energy efficiency levels and the associated environmental/resource impacts. Equally, several of our city processes and services yield a diverse range of waste which if processed/managed in a more integrated and resource-conscious manner (towards closed-loop systems) could serve as sustainable energy sources.

AIM AND SCOPE

This is intended to be a depth-building module aimed at developing skills in analytical, integrative and solution-searching competencies focused on the city-energy-environment/resource nexus. Analytical skills in urban-form and commuting/transport options will be one of the key focus areas. Applying the key components of urban form, density (people and buildings), public transport and localisation, the course will facilitate participants to differentiate between energy efficient and inefficient urban development solutions. Besides the technical skills, the module also aims to challenge participants to engage with the socio-equity outcomes (especially in relation to energy-poverty mitigation and access-to-the-city goals) of different energy-efficient city options and models. Although the module will be primarily based on the fact that the transition to energy efficient cities will be mainly achieved out of our legacy fossil-fuel city structures, it will pay equal attention to patterns of relationship between new urban growth zones/areas (especially with the associated development rights and controls as mechanisms for energy efficient cities).

KEY COMPONENTS

- Urban form, integration and mixed land-use: prevailing patterns, indicators and interventions towards energy-efficiency options/alternatives
- Commuting, public transport infrastructure and services: prevailing patterns, indicators and interventions towards energy-efficiency options/alternatives
- Localisation interventions (including ICT and tele-commuting, urban agriculture, socio-cultural programme enhancements etc): prevailing patterns, indicators and interventions

- Cleaner-fuels (including hydrogen fuel cells) and bio-fuels in transport and buildings: technologies, diffusion and adoption trends
- Combined heat and power (CHP) systems at settlement and municipal scale: technologies, diffusion and adoption trends
- Energy from municipal services (biogas from land-fills and sewage treatment): technologies, diffusion and adoption trends

CRITICAL OUTCOMES OF THE MODULE (COURSE)

This module will primarily be a solutions-searching module at urban-scale. Upon successful completion of the module, participants will have developed competencies to:

- Evolve carbon-footprint as a key component of the eco-footprint of a city (urban-form, infrastructure and services) and life-styles of its residents
- Develop, analyse and integrate urban scale interventions in EE and R across form, services and localisation strategies
- Formulate supportive legislative and incentives programmes/mechanisms for the realisation of the strategies and interventions.

CERTIFICATION

This is a Level-7/8 course (module). A Certificate of Attendance with an indication of the CPD points and level will be awarded to all participants. Participants who complete and submit all assessment requirements (attendance, presentations, assignments etc) successfully will be awarded a Certificate of Competence. This will allow the participant to bank credits in this module (course) towards the Postgraduate Diploma Qualification once it is approved and launched at Wits.

WHO SHOULD ATTEND

The course (module) is of key relevance to built-environment professionals (architects/landscape-architects, engineers, urban planners/designers, quantity surveyors and construction managers) as well as 21st-century property-developers/financiers and investors, public-sector policy-makers (including urban policy-planners), manufacturers/suppliers of EE and RE technologies for the built environment, as well as NGO/CBO-personnel working in the field of sustainable livelihoods, communities and cities. Professionals/consultants working for or running ESCOs (Energy Services Companies) will find the course invaluable for additional dimension to their consulting work.

VENUE, DATE, TIME, COST AND REGISTRATION PROCEDURE

This will be a 1-week (6-days) module (course). The dates, venue, cost and registration procedure for the module will be announced early 2009.

PREVIOUS QUALIFICATION/EXPERIENCE

Although the course (module) is aimed at holders of a bachelors-degree as a minimum requirement, those with a keen interest in this field and a relevant working experience will be considered for both participation and competence certificates. However, such “differently-qualified” participants will not be able to bank the credits towards the postgraduate qualification unless successful evaluation of “prior-learning” has been completed for the participant prior to enrolling in the course (module).

WEEK-PROGRAMME OVERVIEW

DAY-1

- Urban form, density, integration and mixed land-use: prevailing patterns, indicators and strategic-interventions towards energy-efficiency options/alternatives

DAY-2

- Density, commuting, public transport infrastructure and services: prevailing patterns, indicators and strategic-interventions towards energy-efficiency options/alternatives

DAY-3

- Localisation interventions (including distributed-energy supply, ICT and tele-commuting, urban agriculture, local-currency and slow-movement activism, socio-cultural programme enhancements etc): prevailing patterns, indicators and interventions

DAY-4

- Cleaner-fuels (including hydrogen fuel cells) and bio-fuels in transport and buildings: technologies, diffusion and adoption trends
- Energy from municipal services (biogas from land-fills and sewage treatment): technologies, diffusion and adoption trends

DAY-5

- Combined heat and power (CHP) systems at settlement, municipal and building scale: technologies, diffusion and adoption trends

DAY-6

WEEK-ASSIGNMENT/PROJECT PRESENTATION, ASSESSMENT AND MODULE EVLAUATION

CONTACT DETAILS AND ENQUIRIES

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ENERGY EFFICIENT CITIES STUDIES

UNIVERSITY OF THE WITWATERSRAND (WITS)

SCHOOL OF ARCHITECTURE AND PLANNING

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SHORT CERTIFICATE-COURSE-4 (MODULE-4)

BUILDING AND SETTLEMENT INTEGRATED RENEWABLE ENERGY SYSTEMS

25-CREDITS, 6 DAYS

CONVENOR: Dr. Daniel K. Irurah
School of Architecture and Planning

OVERVIEW AND SCOPE

Buildings and their sites are proving to be invaluable platforms for hosting renewable energy systems and thus catalysing the “distributed-generation” strategy of energy efficient cities. The optimisation of this opportunity challenges stakeholders in property development to consider a variety of optimisation strategies (including orientation optimisation) to facilitate maximum harvesting of renewable energy and related resources such as rain/storm water. When coupled to strategic programmes such as housing and infrastructure/buildings for education, health, sports etc, the opportunity for renewable energy supplementation to our fossil-fuel economy is immense. Increased-scale of use of such technologies is expected to bring down costs significantly to make them increasingly attractive options for developers and other stakeholders. This is expected to catalyse a whole new sector in developing countries with immense opportunities for job-creation and entrepreneurship. It is also expected to play a significant role in mitigating energy-poverty among low-income households and communities. It would also be a valuable channel for localisation goals/targets.

AIM AND SCOPE

This is intended to be a depth-building module aimed at developing skills in analytical, integrative and solution-searching competencies focusing on design implications of settlement and building integrated renewable energy technologies. Analytical skills in RE-resource appraisal in an urban zone or site as well as appraisal of RE-technology options will constitute the focus of the module/course. The module will therefore aim for a balanced understanding and competence in technical/applied skills in systems-sizing and assembly as well as financial/economic appraisals in specific application contexts (communities, residential or commercial buildings/site). It is anticipated that the guest-presentations and studio-project for this module will be anchored by RE-systems specialist/consultants with ongoing projects under development. Field trips and site visits will also be to systems assembly-plants or actual community or property development projects where the relevant RE-technologies have been integrated and preferably under monitoring regime.

KEY COMPONENTS

- Solar thermal systems: Principles, resource-appraisal/analysis and systems integration (focus on solar water heating in residential and commercial buildings). This can include solar-assisted air-conditioning systems for buildings at various scales

- Photovoltaics (PV): Principles, resource-appraisal, analysis and systems (focus on building integrated grid-interactive PV - BIPV)
- Wind power systems: Principles, resource-appraisal, analysis and systems (focus on building integrated low-speed micro-turbines for urban/built areas)
- Biomass/biofuels systems: Principles, analysis and integration (focus on transport, domestic-fuel options and local entrepreneurship opportunities)
- Distributed energy-supply systems: Local/community energy systems integration/optimisation

CRITICAL OUTCOMES OF THE MODULE (COURSE)

This module will primarily be a solutions-searching competencies module focusing on integrating RE into the built environment (building and settlement scale) with distributed- and grid-interactive generation as the key framework. Upon successful completion of the module, participants will have developed competencies to:

- Apply manual and electronic tools in appraising of site/micro-climate resource and evolve responsive RE interventions
- Apply simulation and performance appraisal software and models to prioritise and optimise interventions (technical performance appraisal)
- Apply cost-benefit tools to appraise interventions for cost/economic viability
- Integrate interventions into settlement planning and urban/building design

CERTIFICATION

This is a Level-7/8 course (module). A Certificate of Attendance with an indication of the CPD points and level will be awarded to all participants. Participants who complete and submit all assessment requirements (attendance, presentations, assignments etc) successfully will be awarded a Certificate of Competence. This will allow the participant to bank credits in this module (course) towards the Postgraduate Diploma Qualification once it is approved and launched at Wits.

WHO SHOULD ATTEND

The course (module) is of key relevance to built-environment professionals (architects/landscape-architects, engineers, urban planners/designers, quantity surveyors and construction managers) as well as 21st-century property-developers/financiers and investors, public-sector policy-makers (including urban policy-planners), manufacturers/suppliers of EE and RE technologies for the built environment, as well as NGO/CBO-personnel working in the field of sustainable livelihoods, communities and cities. Professionals/consultants working for or running ESCOs (Energy Services Companies) will find the course invaluable for additional dimension to their consulting work.

VENUE, DATE, TIME, COST AND REGISTRATION PROCEDURE

This will be a 1-week (6-days) module (course). The dates, venue, cost and registration procedure for the module will be announced early 2009.

PREVIOUS QUALIFICATION/EXPERIENCE

Although the course (module) is aimed at holders of a bachelors-degree as a minimum requirement, those with a keen interest in this field and a relevant working experience will be considered for both participation and competence certificates. However, such “differently-qualified” participants will not be able to bank the credits towards the postgraduate qualification

unless successful evaluation of “prior-learning” has been completed for the participant prior to enrolling in the course (module).

WEEK-PROGRAMME OVERVIEW

DAY-1

- Solar thermal systems: Principles, resource-appraisal/analysis and systems integration (solar water heating in residential and commercial buildings, including solar-assisted air-conditioning)

DAY-2

- Photovoltaics (PV): Principles, resource-appraisal, analysis and systems (focus on building integrated off-grid and grid-interactive PV - BIPV)

DAY-3

- Wind power systems: Principles, resource-appraisal, analysis and systems (focus on building integrated wind-generators)

DAY-4

- Biomass/biofuels systems: Principles, analysis and integration (focus on transport, domestic-fuel options)

DAY-5

- Distributed energy supply systems: Local/community energy systems – installations, operation and management: integration and optimisation (including storage and grid-interactive options, job-creation and local entrepreneurship opportunities)

DAY-6

WEEK-ASSIGNMENT/PROJECT PRESENTATION, ASSESSMENT AND MODULE (COURSE) EVLAUATION

CONTACT DETAILS AND ENQUIRIES

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ENERGY EFFICIENT CITIES STUDIES

UNIVERSITY OF THE WITWATERSRAND (WITS)

SCHOOL OF ARCHITECTURE AND PLANNING

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SHORT CERTIFICATE-COURSE-5 (MODULE-5)

ENERGY EFFICIENCY IN ARCHITECTURE AND HOUSING

25-CREDITS, 6 DAYS

CONVENOR: Dr. Daniel K. Irurah
School of Architecture and Planning

OVERVIEW AND SCOPE

The production and operation of buildings is one of the most energy-intensive activities of modern economies. In an era when fossil-fuels were cheap and readily available with minimal resource/environmental limits, sensitivity to energy efficiency issues in architecture and buildings was never prioritised in policy or practice. Related benchmarking, building regulations and incentive programmes have been extremely slow to evolve. The emerging constraints of the fossil-fuel economy have thrown the focus into the high levels of waste and inefficiencies associated with this sector. What emerges in the process are tremendous opportunities for energy-efficiency interventions at progressively affordable costs across the whole cradle-to-grave (and now cradle-to-cradle) value chain of buildings and architecture.

AIM AND SCOPE

This is intended to be a depth-building module aimed at developing skills in critically interrogating current practices in design, production and operation of buildings with a view to identifying, appraising and implementing relevant interventions for energy efficiency across the production-operation-disposal/reuse chain of buildings and related systems/components. The primary focus of this module will be new-build/design while the “retrofit” module will focus on upgrading of existing buildings. This differentiation arises from the fact that practice has consistently demonstrated that the best benefit/cost ratio for EE and RE interventions is achieved when such interventions are considered at the earliest opportunity in the project conceptualisation/design/development and operation cycle.

On the operation phase, participants will be introduced to (and challenged to apply) a variety of analytical tools and methods in climatic and thermal-comfort analysis, daylighting and visual comfort as well as strategies of conceptualising, appraising and designing responsive intervention strategies as well as specifying the appropriate components/technologies. In particular, electronic tools and simulation software tools/skills will be emphasised.

On the production/demolition phase, the focus will on analytical tools and methods for embodied energy appraisal as well as related intervention strategies. Guest-presentations and studio-project anchors will be practicing professionals with a strong track of responsive projects. Field trips and site visits will be cases where projects can demonstrate the range of interventions or to industries producing responsive components and systems (for either operation or production phase).

In view of the growing momentum of energy/green building rating and labelling tools/programmes in various countries (including South Africa), the module will integrate several of the focus issues/criteria of such tools into the learning experience of participants.

KEY COMPONENTS

- Micro-climates, climatic site analysis and thermal comfort
- Passive thermal control: Analysis, intervention modelling/simulation
- EE in active/hybrid heating and cooling systems: Analysis, intervention modelling/simulation
- Daylighting, EE-lighting and visual-comfort: Analysis, intervention modelling/simulation
- Embodied energy and EE: Analysis and intervention modelling
- Energy efficiency and green-building rating/labelling systems (standards, credit-criteria, commissioning and fine-tuning)

CRITICAL OUTCOMES OF THE MODULE (COURSE)

This module is primarily a solutions-searching competencies module towards integrating energy efficiency and RE interventions in architecture and housing at the scale of a single building or small clusters within single site/stand developments. Upon successful completion of the module, participants will have developed competencies to:

- Apply manual and software tools for climate-resource appraisal (comfort and resource-opportunity)
- Apply passive cooling/heating principles and interventions towards climatic response in design conceptualisation and development
- Apply manual/physical and software models for design performance appraisal and optimisation
- Apply embodied energy principles and intensities in assessment of embodied energy impacts of design proposals
- Apply green-rating tools to appraise/benchmark existing or proposed buildings for energy efficiency and emission-reduction performance

CERTIFICATION

This is a Level-7/8 course (module). A Certificate of Attendance with an indication of the CPD points and level will be awarded to all participants. Participants who complete and submit all assessment requirements (attendance, presentations, assignments etc) successfully will be awarded a Certificate of Competence. This will allow the participant to bank credits in this module (course) towards the Postgraduate Diploma Qualification once it is approved and launched at Wits.

WHO SHOULD ATTEND

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VENUE, DATE, TIME, COST AND REGISTRATION PROCEDURE
This will be a 1-week (6-days) module (course). The dates, venue, cost and registration procedure for the module will be announced early 2009.

PREVIOUS QUALIFICATION/EXPERIENCE
Although the course (module) is aimed at holders of a bachelors-degree as a minimum requirement, those with a keen interest in this field and a relevant working experience will be considered for both participation and competence certificates. However, such "differently-qualified" participants will not be able to bank the credits towards the postgraduate qualification unless successful evaluation of "prior-learning" has been completed for the participant prior to enrolling in the course (module).

WEEK-PROGRAMME OVERVIEW

DAY-1
- Micro-climates, climatic site analysis and thermal comfort (including adaptive thermal comfort)

DAY-2
- Passive thermal control: Analysis, intervention modelling/simulation
- EE in active/hybrid heating and cooling systems: Analysis, intervention modelling/simulation

DAY-3
- Daylighting, EE-lighting and visual-comfort: Analysis, intervention modelling/simulation

DAY-4
- Embodied energy and EE: Analysis and intervention modelling

DAY-5
- Energy efficiency and green-building rating/labelling systems (standards, credit-criteria, commissioning and fine-tuning)

DAY-6
WEEK-ASSIGNMENT/PROJECT PRESENTATION, ASSESSMENT AND MODULE EVLAUATION

CONTACT DETAILS AND ENQUIRIES
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ENERGY EFFICIENT CITIES STUDIES

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SHORT CERTIFICATE-COURSE-6 (MODULE-6)

ENERGY EFFICIENCY RETROFIT IN EXISTING BUILDINGS

25-CREDITS, 6 DAYS

CONVENOR: Dr. Daniel K. Irurah
School of Architecture and Planning

OVERVIEW AND SCOPE

In view of current and past practices of disregard for energy efficiency and renewable energy in property design and development, most of the existing stock of residential, commercial and public-sector buildings (including schools and clinics for example) were designed and built with minimal EE and RE optimisation interventions. In view of the large numbers of this stock as well as their major inefficiencies, there exists tremendous opportunities for energy savings through retrofitting such stock (and their related appliances) with EE and RE interventions.

Although practice has clearly demonstrated that the best benefits/costs ratio for interventions is best achieved when interventions are integrated into new designs/developments at the earliest opportunity (with orientation as key example which is difficult to optimise in retrofit), varying options for retrofit in existing stock can be considered to suit varying levels of upgrade/maintenance and refurbishment budgets and regimes. Equally, facilitating interactive/adaptive user behaviour in such buildings could be one of the minimal-cost strategies for energy efficiency, especially in properties where automated systems (such as lighting and air-conditioning) are centralised and set at wasteful levels with no relation to user-patterns and user-interface.

AIM

This is a solutions-seeking competencies module which aims to facilitate participants appraise an existing building and evolve responsive EE and RE interventions. Although most of the principles of the module are closely related to those for new designs as covered in Module-5, further skills/competencies are required for effective interventions in retrofit projects. Key among these are energy and user-behaviour audits using specialised tools/equipment and techniques (data-loggers and thermal-imaging cameras for example). It is anticipated that this course will complement the ongoing training initiatives for ESCos-professionals in South Africa.

KEY COMPONENTS

- Performance, maintenance/refurbishment cycles/regimes for buildings (operation phase)
- Envelope audit, performance appraisal and retrofit design
- Energy audit: principles, scope, tools, method and data management
- Lighting audit and retrofit design
- Efficiency through user-behaviour versus automation
- Smart-building and ICT- integration in building/facilities management
- Spatial-efficiency and efficient-appliance strategies

- Appliance energy-rating, selection and operation
- Process energy recovery in buildings (combined heat and power – CHP, heat-pumps etc)

CRITICAL OUTCOMES OF THE MODULE (COURSE)

On successful completion of the course, participants will be able to:

- Apply documentations (such as electricity-bills), walk-through observations and equipment/data-logger techniques of energy audit in existing buildings
- Apply visual observation and recording techniques (such as sketching and photography) for envelope and materials audit of existing buildings
- Analyse/integrate collected data to evaluate EE and RE opportunities
- Evolve design and user user-behaviour interventions for the EE and RE for existing building
- Oversee implementation and monitoring of retrofit interventions performance

CERTIFICATION

This is a Level-7/8 course (module). A Certificate of Attendance with an indication of the CPD points and level will be awarded to all participants. Participants who complete and submit all assessment requirements (attendance, presentations, assignments etc) successfully will be awarded a Certificate of Competence. This will allow the participant to bank credits in this module (course) towards the Postgraduate Diploma Qualification once it is approved and launched at Wits.

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VENUE, DATE, TIME, COST AND REGISTRATION PROCEDURE

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WEEK-PROGRAMME OVERVIEW

DAY-1

- Performance, maintenance/refurbishment cycles/regimes for buildings (operation phase)
- Spatial-efficiency and efficient-appliance strategies

- Appliance energy-rating, selection and operation

DAY-2

- Envelope audit, performance appraisal and retrofit design (including cost-appraisal)

DAY-3

- Energy-use audit: principles, scope, tools, method and data management
- Lighting audit and retrofit design (including cost-appraisal)

DAY-4

- Process energy recovery in buildings (combined heat and power – CHP, heat-pumps etc)

DAY-5

- Adaptive user behaviour and automation for EE
- Smart-building and ICT- integration in building/facilities management

DAY-6

WEEK-ASSIGNMENT/PROJECT PRESENTATION, ASSESSMENT AND MODULE EVLAUATION

CONTACT DETAILS AND ENQUIRIES

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