

# ION COURSE



Coordination of University Research for Synergy and Effectiveness

## COURSE MEMBERS

### Companies

Advanced Geotechnology Inc.  
 Albian Sands Energy Inc.  
 Applied Patents Inc.  
 Arknil Enterprises  
 Burlington Resources Canada Energy Ltd.  
 Burning Rock Oil Co. Ltd.  
 Canadian Occidental Petroleum  
 D.E. Towson & Associates Inc.  
 ELF Exploration Production  
 Fekete Associates Inc.  
 Fluid Treatment Technologies Inc.  
 Husky Oil Operations  
 Imperial Oil Resources Limited  
 International Downhole Equipment Ltd.  
 INTRATECH  
 Komex International Ltd.  
 Nordic Acres Engineering Ltd.  
 NOVA Chemicals Ltd.  
 Opus Petroleum Engineering Ltd.  
 PanCanadian Petroleum Limited  
 Petro-Canada Oil and Gas  
 Petrovera Resources  
 Rakhit Petroleum Consulting Ltd.  
 Suncor Energy Inc.  
 Syncrude Canada Limited  
 T.J. McCann and Associates Ltd.  
 Ulster Petroleum Ltd.

### Research Organizations

Alberta Research Council  
 Canadian Energy Research Institute  
 CANMET Western Research Centre  
 National Centre for Upgrading Technology

### Industry Associations

Alberta Chamber of Resources  
 Petroleum Technology Alliance of Canada  
 Canadian Energy Pipeline Association

### Government Organizations

Alberta Energy Research Institute  
 Alberta Energy and Utilities Board  
 Alberta Environment  
 Alberta Science, Research and Technology Authority  
 Fisheries and Oceans Canada

### Universities

University of Alberta  
 University of Calgary

### Principal Researchers

Kevin W. Biggar, University of Alberta  
 Viola I. Birs, University of Calgary  
 Prithvi Bishnoi, University of Calgary  
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 Tongwen Chen, University of Alberta  
 Weixing Chen, University of Alberta  
 Karl Chuang, University of Alberta  
 Naser El-Sheimy, University of Calgary  
 Phillip M. Fedorak, University of Alberta  
 Samuel Frimpong, University of Alberta (2 projects)  
 Yang Gao, University of Calgary  
 Murray R. Gray, University of Alberta  
 Patrick Hettiaratchi, University of Calgary  
 Alan Hildebrand, University of Calgary  
 Ronald J. Hugo, University of Calgary  
 Apostolos Kantzas, University of Calgary (2 projects)  
 Ronald Kydd, University of Calgary  
 Donald C. Lawton, University of Calgary  
 Dongyang Li, University of Alberta  
 Larry Lines, University of Calgary  
 Qi Liu, University of Alberta (2 projects)  
 Brij B. Maini, University of Calgary (4 projects)  
 Jacob Masliyah, University of Alberta  
 Carl Mendoza, University of Calgary  
 Bruce J. Milne, University of Calgary  
 Peter Miney, University of Alberta  
 Martin P. Mintchev, University of Calgary  
 Gordon Moore, University of Calgary  
 Karlis Muehlenbachs, University of Alberta  
 Krishnaswamy Nandakumar, University of Alberta  
 Anne L. Norman, University of Calgary  
 Nancy Papanikolaou, University of Calgary  
 M. Poodadi-Darwish, University of Calgary (2 projects)  
 Laurier L. Schramm, University of Calgary (adjunct)  
 Sanjay Srinivasan, University of Calgary  
 Robert Stewart, University of Calgary  
 Jozef Szymanski, University of Alberta  
 Dwayne D. Tannant, University of Alberta  
 Gregory T. Taylor, University of Alberta  
 Gerrit Voordouw, University of Calgary  
 Richard Wain, University of Calgary  
 Ron K.C. Wang, University of Calgary (2 projects)  
 Wilsun Xu, University of Alberta (2 projects)  
 Zhenghe Xu, University of Alberta  
 Harvey Yarranton, University of Calgary  
 Hong Zhang, University of Alberta

## Search for Full-Time COURSE Director

Dr. Richard Luhnig has served as chair of the COURSE Board and as part-time director since inception in 1999. The outstanding success and growth of COURSE, now with 54 projects valued at just under \$16 million, has increased the responsibilities for the director. A search is underway for a new director for COURSE.

The COURSE director reports directly to the COURSE Board and is responsible for:

- identifying energy research needs by working closely with energy industry associations and members,
- promoting the COURSE research funding opportunity to industry and university researchers,
- encouraging and nurturing new research relationships between the universities, faculties and industry, resulting in enhanced applications,
- facilitating research contract and grant development between industry, university technology transfer offices and researchers,
- facilitating the funding competitions by organizing the application review process and enlisting representative review panel members, and
- coordinating the support staff assigned by the universities of Alberta and Calgary to assist in the administration of COURSE.

If you are interested, or know some one who is, please send resume(s) to:

**Alberta Innovation and Science**  
 Human Resources Division  
 RE: COURSE Director  
 2<sup>nd</sup> floor, 6950 - 113 Street  
 Edmonton, Alberta T6H 5V7  
 Phone 780 427-8296  
 Fax 780 422-5138  
 Email innov.sci.resume@gov.ab.ca

## 19 NEW PROJECTS COURSE Launches 19 New Projects

The January 2001 COURSE competition for research funding into energy resources research received a record number of 62 applications. The 19 people on the evaluation panel (11 industry, 5 university and 3 government) recommended 20 applications for approval. The 20 approved applications resulted in 19 new projects as two applications proposed work in the same area and were combined into one project. The value of the projects, of 1 to 3 years in duration, is about \$8 million dollars of which \$3 million is provided by the Ministry of Innovation and Science via the Alberta Energy Research Institute (AERI) with the remainder from companies, NSERC and others. Since the first competition in June 1999, COURSE has launched 54 new projects at Alberta universities valued at just under \$16 million.

Please see inside pages for project descriptions . . .

## 54 PROJECTS Launched in 2 Years

COURSE was formed in March 1999 and had its first competition for funding in June 1999. In the 21 months, up to the third competition in January 2001, COURSE has launched 54 new projects valued at just under \$16 million of which \$6.5 million is provided by Alberta Innovation and Science via AERI.

### June 1999 Applications (15 of 59 funded)

- Innovation and Science \$1.5 million
- Industry, NSERC, others \$1.1 million

### January 2000 Applications (20 of 61 funded)

- Innovation and Science \$2.0 million
- Industry, NSERC, others \$3.3 million

### January 2001 Applications (20 of 62 funded - 19 projects)

- Innovation and Science \$3.0 million
- Industry, NSERC, others \$4.7 million

## 2002 Funding Competition

The next competition will close on or before Wednesday, January 30, 2002. AERI's funding for COURSE projects is for up to \$3 million/year with most proposals having a three-year time frame. A request for proposals with further details will be issued in the fall of 2001.

## Student Training

The approved projects from the January 2001 competition will support training for 149 student years over the 1-3 year funding period for the 19 new projects. The training and development of skilled personnel through the research project activity is important. Projects may be staffed, in order of preference, by graduate students, post-doctoral fellows, research assistants and technicians. A new Principal Researcher is given preference to the extent of "points" in the evaluation criteria.

## 19 New Projects Funded in January 2001 Competition

The 19 new projects funded in the January 2001 competition are described below.

For more information on a specific project, please contact the identified researcher directly.

More general questions may be addressed to COURSE – contact information available on back page.

# NEW PROJECTS

## CONVENTIONAL OIL / GAS & EOR

### Geological Controls on the Isotope Geochemistry of Formation Gases in the Alberta Oilfields

To document the isotopic variation of any gas from surface through the various stacked seals and gas reservoirs.

#### Karlis Muehlenbachs

University of Alberta  
Phone: 780 492-2827  
Fax: 780 492-2030  
Email: kmuehlen@gpu.srv.ualberta.ca

### Data Sufficiency for Petroleum Reservoir Decision Making

To adapt modern geostatistical and risk analysis tools to provide a quantitative assessment of reduction of uncertainty and risk and to establish guidelines for the assessment of relative worth of additional information.

#### Sanjay Srinivasan

University of Calgary  
Phone: 403 220-6691  
Fax: 403 282-3945  
Email: ssriniva@ucalgary.ca

### Effect of Residual O<sub>2</sub> in CO<sub>2</sub> for a Combined Miscible Flood/CO<sub>2</sub> Sequestration Process

A study of oxygen contamination to identify the maximum acceptable concentration of oxygen as an impurity in the CO<sub>2</sub> which is injected into an oil reservoir.

#### Gordon Moore

University of Calgary  
Phone: 403 220-7217  
Fax: 403 284-4852  
Email: moore@enchn.ucalgary.ca

## ELECTRICITY

### Fatigue Analysis and Damage Mitigating Control of Industrial Co-generation Systems

To increase component durability and extend service life of industrial co-generation systems by redesigning control systems.

#### Tongwen Chen

University of Alberta  
Phone: 780 492-3940  
Fax: 780 492-1811  
Email: tchen@ee.ualberta.ca

### A New Technique for Mitigating Electrical Disturbances Caused by Energizing Generator Transformers

To find a solution to mitigate inrush disturbances in co-generators.

#### Wilsun Xu

University of Alberta  
Phone: 780 492-5965  
Fax: 780 482-1811  
Email: wxu@ee.ualberta.ca

## ENVIRONMENTAL

### Control of Methane Emissions from Heavy Oil Development

To develop biological oxidation as a viable technique for reducing methane emissions at heavy oil production well sites.

#### Patrick Hettiaratchi

University of Calgary  
Phone: 403 220-5503  
Fax: 403 282-7026  
Email: jhettiar@ucalgary.ca

### Geomechanical – Reservoir Processes of Waste Injection (Disposal) into Unconsolidated Formations

To investigate geomechanics – reservoir mechanisms through comprehensive research program involving field monitoring, laboratory testing and numerical modelling.

#### Ron C.K. Wong

University of Calgary  
Phone: 403 220-4998  
Fax: 403 282-7026  
Email: rckwong@ucalgary.ca

## FUEL CELLS

### Fuel Cell for Conversion of Hydrogen Sulfide

To develop a H<sub>2</sub>S-O<sub>2</sub> (air) fuel cell for the production of sulfur vapor, steam and electrical power.

#### Karl T. Chuang

University of Alberta  
Phone: 780 492-4676  
Fax: 780 492-2881  
Email: karl.t.chuang@ualberta.ca

### Improving Solid-Oxide Fuel Cell Operation Using Hydrocarbon Fuels

To study the reaction of hydrocarbon fuels with SOFC anode catalysts using a number of novel spectroscopic and microscopic approaches to determine the mechanism of reaction.

#### Ronald Kydd

University of Calgary  
Phone: 403 220-5340  
Fax: 403 289-9488  
Email: kydd@ucalgary.ca

## HEAVY OIL

### Foamy Oil Flow in Cold Production of Heavy Oil

To develop a method of linking the type of flow that will occur to the properties of the reservoir and the operational variables.

#### Brij B. Maini

University of Calgary  
Phone: 403 220-8777  
Fax: 403 282-3945  
Email: bmaini@ucalgary.ca

### Seismic Monitoring for Enhanced Heavy Oil Recovery

To enhance reservoir characterization and improve reservoir models by applying elastic-wave (P and S) analysis to multi-component seismic data from both surface and borehole surveys.

#### Larry R. Lines

University of Calgary  
Phone: 403 220-2796  
Fax: 403 284-0074  
Email: lines@geo.ucalgary.ca

## IN SITU OIL SANDS

### Impact of Asphaltene-Solvent Interaction on VAPEX Process

X-ray flow visualization and NMR relaxometry will be performed on a sand pack undergoing VAPEX.

#### Apostolos Kantzas

University of Calgary  
Phone: 403 220-8907  
Fax: 403 282-5060  
Email: akantzas@ucalgary.ca

### Scale-up of Dispersion Coefficients in Vapex Process

To develop a methodology for up-scaling of the dispersion coefficients by experimenting with laboratory models of different scales.

#### Brij B. Maini

University of Calgary  
Phone: 403 220-8777  
Fax: 403 282-3945  
Email: bmaini@ucalgary.ca

### A Microstructural Approach to Modelling Sand Production

To develop a model for the porous-mechanical behaviour of unconsolidated sand coupled with a three phase oil-water-gas fluid flow and heat in order to address sand production and borehole stability in vertical, horizontal and slanted wells.

#### Richard G. Wan

University of Calgary  
Phone: 403 220-5504  
Fax: 403 282-7026  
Email: wan@ucalgary.ca

# NEW PROJECTS

... continued

## NEW FRONTIER

### Experimental and Modelling Study of the Kinetics and Thermodynamics of Hydrate Decomposition – Numerical Simulation of Hydrate Decomposition

A joint project to obtain experimental data and model the thermodynamics and intrinsic kinetics of gas hydrate decomposition.

#### Prithwi Bishnoi

University of Calgary  
Phone: 403 220-6695  
Fax: 403 282-3945  
Email: bishnoi@ucalgary.ca

#### Mehran Pooladi-Darvish

University of Calgary  
Phone: 403 220-8779  
Fax: 403 284-4852  
Email: pooladi@ucalgary.ca

## OIL/GAS PIPELINES

### Real-Time Internet-Based Surveillance of Oil/Gas Pipelines

Development of an innovative internet-based airborne remote sensing system.

#### Naser El-Sheimy

University of Calgary  
Phone: 403 220-7587  
Fax: 403 284-1980  
Email: naser@geomatics.ucalgary.ca

## OIL SANDS MINING

### Intelligent Shovel Excavation in Varying Oil Sands Formation and Bitumen Content

To provide a basis for developing and intelligent shovel excavation (ISE) technology.

#### Samuel Frimpong

University of Alberta  
Phone: 780 492-4053  
Fax: 780 492-0249  
Email: sam.frimpong@ualberta.ca

## SERVICE INDUSTRY and SEISMIC/ EXPLORATION

### Wireless Digital Sensors and Analysis Systems for Monitoring Petroleum Reservoirs

Using advanced wireless transmission in exploration seismic systems for the monitoring of producing hydrocarbon reservoirs as well as the active surveying of prospective areas.

#### Robert R. Stewart

University of Calgary  
Phone: 403 220-3265  
Fax: 403 284-0074  
Email: stewart@geo.ucalgary.ca

## SLURRY PIPELINES

### Investigation of the Erosion-Corrosion Mechanisms in Slurry Flow

To develop and verify a reasonable model of complex fluid flow/corrosion/erosion process that occur in slurry transport piping.

#### Peter D. Minev

University of Alberta  
Phone: 780 492-3398  
Fax: 780 492-2881  
Email: minev@ualberta.ca

# RECORD NUMBER OF APPLICATIONS

## Broad Mandate Attracts Record Number of Applications for January 2001 Competition

The Alberta Science, Research and Technology Authority (ASRA) and AERI widened the mandate for the COURSE energy resources research competition. The wider mandate resulted in a record number of applications for the January 2001 competition. Some of the areas in the widened mandate have not had specific funding competitions in Alberta for several years – coal, for example. The mandate topics with number of applications and approvals for funding are tabulated below:

Area of Interest	Applications	Approvals
Environmental	10	2
Heavy Oil	5	2
Upgrading	1	0
Service/Seismic	2	1
Drill/Completions	1	0
Oil Sands Mining	6	1
Oil Sands Extraction	0	0
Tailings Ponds	2	0
In Situ Oil Sands	5	3
Conv. Oil/Gas, EOR	5	3
Plant Operations	2	0
Slurry Pipelines	1	1
Oil/Gas Pipelines	4	1
Fuel Cells	4	2
Biomass	1	0
Electricity Generate	3	2
Hydro. Energy	1	0
Coal Bed Methane	1	0
Hydrogen	0	0
Wind Power	0	0
Petro-Chemicals	0	0
Coal	0	0
Solar Energy	0	0
New Frontiers	8	2*
<b>TOTAL</b>	<b>62</b>	<b>20</b>

\* combined as one project

## Pro-Active Application Review

The 19-person application review panel is asked to be pro-active in evaluating the applications. The January 2001 panel recommended:

- 20 of the 62 applications for funding,
- 10 applications were recommended without changes,
- 7 applications were recommended with reduced funding,
- 1 application was recommended with wider scope and larger funding,
- 2 applications working in the same area were recommended to be combined, and
- 7 other applications were recommended for funding from other sources or if additional funds become available.

All recommendations were approved by COURSE, AERI and ASRA and accepted by the applicants.

## Research Collaboration

Collaboration among researchers, faculties and universities, to form the best research teams, is an important aspect of the COURSE initiative. The approved applications for the January 2001 have the following collaboration:

- projects with inter-faculty or inter-university teams – 37%
- projects with inter-university teams – 27%
- collaborations that are inter-university – 71%

## Evaluation Panel and Procedure

The COURSE application review panel has the most important and difficult duty to review and recommend the applications for funding. For the January 2001 competition, with the broad funding mandate, a panel of 19 people was formed comprising 11 industry, 5 university and 3 government (AERI).

Members of the COURSE Board nominate expert industry personnel for the panel. The COURSE Board then votes to elect the industry experts for the panel. There have been more nominations than "spots" for industry personnel for all three competitions held to-date.

An individual representing industry is limited to serving for two competitions. The University of Alberta and Calgary may independently appoint up to three voting representatives each to the panel. AERI may appoint expert personnel to the panel but are currently limited to one combined vote. The names of the people on the evaluation panel are held confidential. The COURSE Director chairs the panel but does not vote.

The COURSE Board reviews the recommendations of the panel. The AERI Board then reviews the recommendations from the COURSE Board. The AERI recommendations are then provided to the ASRA Board for funding approval.

## How to Access COURSE Technology

The University conducting the work owns the technology and is the exclusive license agent for the technology.

To access the technology, please contact:

**Lorna Very**  
University of Calgary  
Research Services Office  
Email: [very@ucalgary.ca](mailto:very@ucalgary.ca)

**Bonnie Albrecht**  
University of Alberta  
Industry Liaison Office  
Email: [bonnie.albrecht@ualberta.ca](mailto:bonnie.albrecht@ualberta.ca)

## Industry Experts Wanted

There are a limited number of openings for industry experts to serve on the 2002 COURSE application evaluation panel. Research expertise or hands-on field experience in one or more of the COURSE funding areas is essential. Preference is given to Canadian and worldwide employees of COURSE member companies.

For more information, please contact:

**Alice Hedges**  
Email: [alice.hedges@gov.ab.ca](mailto:alice.hedges@gov.ab.ca)

## Thank You Members

In the first COURSE newsletter of November 1999, fee-free membership in COURSE was invited. As shown in the listing of Members on the front page, the response of companies, research organizations, industry associations, government organizations (provincial and federal) and universities was wonderful.

The benefits of membership are:

- Promote energy research priorities**
  - Leadership Board
  - Application Evaluation Panel
  - Special Task Forces
- Competitive advantage**
  - Awareness of energy research projects
  - Identifying top researchers in the field.

The Membership/Newsletter Fax Back below can be used to apply for membership and/or to receive this "ON COURSE" newsletter.

## Membership/Newsletter Fax Back

Please fax back this page to (403) 297-3638 to receive your fee-free membership information package. New members will be featured in the next newsletter.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Fax \_\_\_\_\_ Phone \_\_\_\_\_

Email Address \_\_\_\_\_

Select one category under which to list, or change the listing for your organization in the newsletter.

- |  |  |
|--|--|
| <input type="checkbox"/> Producing Company     | <input type="checkbox"/> Industry Association    |
| <input type="checkbox"/> Service Company       | <input type="checkbox"/> Government Organization |
| <input type="checkbox"/> Research Organization | <input type="checkbox"/> University              |

## ON COURSE

**ON COURSE Newsletter** is published by COURSE – Coordination of University Research for Synergy and Effectiveness – to increase communication between industry, government and university research providers for energy resources.

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