

# Ace the group design project...

... and win medals for it! University of Sydney's **Don White** and **Wayne Davies** tell **Helen Tunncliffe** how.

**T**HE final-year group design project is guaranteed to strike fear into the hearts of chemical engineering students the world over. Helping to alleviate this fear is the prospect not only of a good degree, but a global award: the IChemE MacNab-Lacey prize.

What makes a good design project and an award-winning team? Don White and Wayne Davies are men who know the answer. White is an adjunct associate professor of chemical and biological engineering at the University of Sydney (UoS), Australia, and heads up the team running the group design projects. Davies was one of the team of industrial supervisors and supervised the 2010 MacNab-winning group of five students – Kate Macfarlane, Nathalie Bou Karam, Christopher Jazrawi, Warren Oakes and James Quinn – the Biox group. The group project in 2009 was to design a baker's yeast plant and Davies says this group stood out early on.

"I soon realised this was an extraordinary group and I thought: 'A gold nugget has just fallen into my lap. I'd better help polish it up,'" he says.



## IChemE's MacNab-Lacey prize

A merger of IChemE's MacNab and Lacey prizes now means that any student design project with a sustainability element is eligible for entry (see **tce** 828 p52) to win an award, not just those whose institutions have received accreditation visits that year. If the MacNab-Lacey prize is in your sights this year, work as a team, emphasise good communication, define each and every task, and rely on your supervisor for guidance and direction!

According to Davies, a winning design project is not just dependent on the students, but also the supervisors and the project's organisation. How the project is set in the first place, and its content, are crucial to the success of the students' finished article, with a good project having sufficient scope for the best students to show their prowess, but not so complex that weaker students are overwhelmed, leading to superficial answers and mental exhaustion.

Each sequential task in the UoS design project has a clear template and its own deadline. Both men believe that trying to add too much detail can be a distraction for the students, and White notes that the templates developed by UoS over the years include caps on the level of detail to avoid "mindless repetitive slog."

Davies uses the following example: "A true executive summary needs to be just a couple of pages and requires no more information than is necessary for company executives to execute a decision," adding "the bottom line is, will the project make more money than investing in a fixed-term loan while satisfying the various constraints?"

Davies spent much time reading and reviewing the Biox group's material, editing and suggesting improvements. "When a coach realises that they have a world-class athlete, they work with greater resolve because they know there is a real possibility of doing something extraordinary," he declares.

The way the students work together and respond to direction and help is equally as important as the direction and help offered. The Biox group was a perfect example.

"I would make suggestions and the group would follow them up and then go 50% further. It was breathtaking," he adds.

The group's leader, Kate Macfarlane, led by example, showing consistent commitment to quality and high standards, which were rapidly picked up by her colleagues, a management style Davies says should be made into a manual.

"Over some 28 years of teaching design (on and off), I have supervised outstanding groups as well as more modest groups.



The 2010 MacNab-winning group of five students – James Quinn, Nathalie Bou Karam, Warren Oakes, Kate Macfarlane, Christopher Jazrawi

One clear message is: when the members put the group before themselves, the group benefits. When members work on their own tasks, selfishly fishing for marks, the outcome is mediocre at best and disastrous at worst," Davies says.

The Biox group, once again, went above and beyond dutiful teamwork. The members organised internal mentoring sessions, where those who were strong in certain areas tutored those who were less so, something Davies says caused him to "glow with approval." This, along with the group's outstanding cooperation and communication, led to high-quality individual design elements, backed up by good understanding of both the mathematics and the physical and chemical implications of the designs. The group was also rigorous at keeping to deadlines. Failure to do this is something White says typically snowballs to ever-declining standards.

All of the Biox team's decisions in the project were made with "engineering judgement," based not only on what was good from an engineering perspective, but also what was professionally wise. When such key decisions can be traced to a formal procedure, Davies says, mistakes in a new start-up can be corrected likewise using a formal procedure, something which inspires confidence in investors and was well understood by the MacNab winners.

White was equally proud. He says that the winning group's final report was equivalent to something a professional would produce. **tce**