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SECOND LOCKDOWN IS ON

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COURTESY ADRIAN BLACKWELL



UW to host campus memorial for dean emeritus, Pearl Sullivan

Saihaj Dadhra
Assistant News Editor

The University of Waterloo has announced details regarding the campus memorial for the Faculty of Engineering's dean emeritus, Pearl Sullivan.

"Pearl Sullivan was truly an inspiration. Her accomplishments at the University of Waterloo prove that no matter the challenges female engineers face, we can always succeed through dedication and perseverance.

Pearl's role as the first female Dean of Engineering has paved the way for students such as myself to realize our full potential; for that, we will always hold the utmost respect and admiration towards her," a first-year Nanotechnology Engineering student,

who asked to remain anonymous, said.

The memorial will take place on Tuesday, Jan. 26, 2021 from 11:30 a.m. to 12:00 p.m. on YouTube Live.

UW students, faculty and staff are invited to attend the online memorial, celebrating and reflecting on Pearl Sullivan's life and her service as a professor, department chair and dean.

UW President and Vice-Chancellor, Feridun Hamdullahpur, Dean of the Faculty of Engineering, Mary Wells, Provost and Vice-President Academic, James Rush, and Former President of the Engineering Society, Abdullah Barakat will be speaking at the memorial, along with a special performance from the a capella group, the Water Boys.

Registration details can be found on the Wednesday, Jan. 13, 2021 edition of the UW Daily Bulletin.



Pearl Sullivan passed away on Nov. 28, 2020, after a 12-year battle with cancer.

Ontario govt. issues state of emergency and stay-at-home order

What you need to know about Ontario's stay-at-home new and extended restrictions

Kelly De Leon
Reporter

Premier Doug Ford declared a second provincial state of emergency, issuing a stay-at-home order that will be in effect for 28 days.

The additional restrictions come in response to a new COVID-19 model, which predicts intensive care units to be filled by early next month, with daily mortality rates doubling between mid-January and the end of February.

Effective Thursday, Jan. 14, 2021, at 12:01 a.m., residents were ordered to stay at home, with exceptions for essential work and activities such as picking up groceries, accessing health care services, going to medical appointments, or exercise.

The new COVID-19 modelling reveals a sharp rise in COVID-19 cases, hospitalizations, and deaths.

"The system is on the brink of collapse...

we are at levels we haven't seen before," Ford said in a statement, adding that eight new cases of a highly contagious COVID-19 variant from the UK have been confirmed in the province.

"Cases and deaths are the highest since the start of the pandemic and community spread continues to escalate. I'm not blaming anyone, only one thing is truly at fault and that's the virus," Ford said.

The state of emergency declaration is to reduce mobility and the number of daily contacts people have with those outside their immediate household.

Ford says the stay-at-home order is not a curfew and that a curfew will not be implemented in Ontario because he "does not believe in that."

Outdoor gathering sizes will be reduced from 10 people to five and those who live alone are allowed to spend time with one other household.

However, the government implores people to stay home as much as possible.

All businesses must ensure non-essential employees who can work from home do so, except in special circumstances "where the nature of their work requires them to be on-site at the workplace," the government said.

All non-essential retail stores (hardware, alcohol, big box retailers, stores offering curbside pickup) will have operating hours of 7 a.m. - 8 p.m.

Ford said big box stores must follow these protocols or else he will "come down on them like an 800 pound gorilla," to enforce the restrictions.

As for restaurants, pickup and delivery will still be allowed throughout the lockdown.

Non-essential construction is also restricted.

Essential construction includes projects in the healthcare, long-term care, transit, and education sectors.

Residential construction projects are allowed with exceptions.

Renovations that started before Jan. 12,

condominium, mixed-use construction projects, and single-family, semi-detached, and townhome construction projects already granted with a footing permit are allowed.

There will also be no in-class instruction until Feb. 10 for schools from the following public health units (PHUs): Toronto, York, Peel Region, Hamilton, and Windsor-Essex.

The government said the Chief Medical Officer of Health will advise the Ministry of Education on which PHUs will be allowed to resume in-person instruction by Jan. 20.



UW prepares for second lockdown

Grace Xie
Editorial Assistant

In response to increasing positive COVID-19 cases, the Ontario government announced a province-wide lockdown in an attempt to contain the surge of cases. The announcement includes new restrictions and health guidelines which impact everyone, especially students as they await more information on changes to their academic plans. Imprint spoke to UW and the Waterloo Undergraduate Student Association (WUSA) for more information on how UW will be handling the second lockdown.

On Tuesday, Jan. 12, 2021, Ontario declared a second provincial emergency to address the COVID-19 crisis. The announcement includes new restrictions and health guidelines aimed at limiting people's mobility and reducing daily contact with others. Some of the new restrictions to take effect on Thursday, Jan. 14 include, limited social gathering with up to five people, and mask or face covering requirement in indoor ar-

reas. On Wednesday, Jan. 13, 2021, UW released a statement on its official website, re-enforcing the Ontario government's safety guidelines and outlining the school's guidelines for the second lockdown. According to the website, students are to only visit campus if necessary and for essential trips. Instructors will notify students of any changes to classes.

"All of the safety measures that were in place before this new lockdown are still in place now. As are all the supports for students – including mental health and academic supports through Campus Wellness, the SSO, and the faculties," a representative from UW said.

Additionally, WUSA stated that they will be offering their services both on-campus and off-campus – specifically the Turnkey desk, student-run services, and used textbooks.

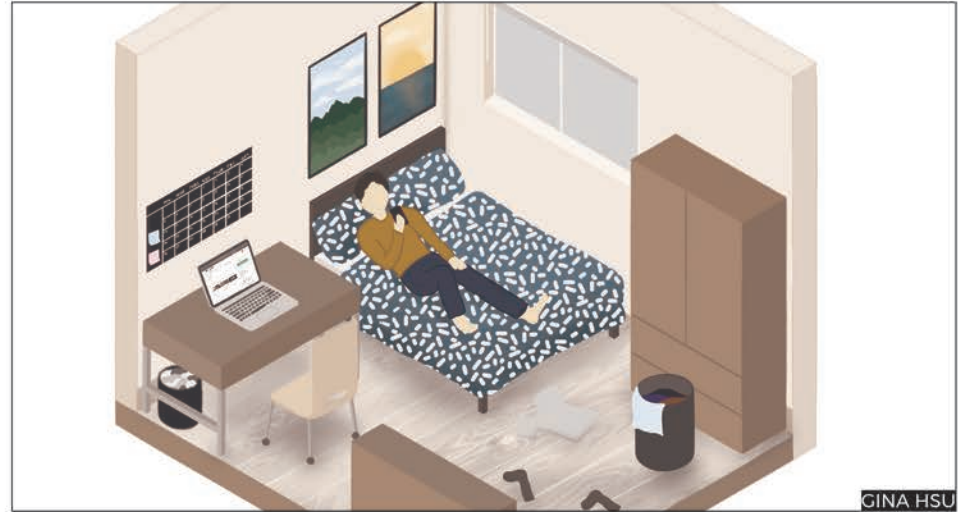
"WUSA is still offering services to our students through the Turnkey desk, student-run services, used textbooks, and commercial operations..WUSA is encouraging all students to stay home and stay safe. We

will continue to offer services online (like peer support, used textbooks) and are always available to hear student concerns," Abbie Simpson, President of WUSA, said.

Moreover, WUSA emphasizes that they will continue to advocate student's concerns as well as offer their full support financially.

"WUSA will continue to raise student

concerns with courses as we hear them. The Academic Readiness Bursary was available to students this term. WUSA worked hard in Winter 2021 to ensure this was available to students. As for supports, WUSA is still running our peer support services, our Centre for Academic Policy Support, and WUSA Clubs continue to run," Simpson said.



Lori Campbell receives the National Women of Inspiration Indigenous Leader Award 2020

Karen Chen
News Editor

Lori Campbell understands both the pain of being the 'other' and the joy of carving your own place in the world. Campbell is the recipient of the National Women of Inspiration Indigenous Leader Award of the Universal Women's Network 2020. Representing both the Indigenous and LGBTQ+ community, Lori Campbell is a survivor of cultural genocide, as an intergenerational survivor of the Residential School system and a descendant of the Sixties Scoop Generation.

Coming out to her parents as Two-Spirit only to lose touch with them is a tragic story that many can relate to, but Campbell's story is one of optimism. She is a trailblazer for others who must take a stand in the name of self love, she lives her truth as 'unapologetically Indigenous, and she shares her experiences and wisdom as a political leader in the NDP taking action on issues she is passionate about.

In an interview shortly after receiving the award, Campbell said, "When I was younger

it was hard to imagine receiving this type of recognition," Campbell said. "I never really saw myself reflected in leadership positions. But I really hope my work inspires young women, particularly Indigenous women, to make their voices heard and for them to know that they belong in leadership positions."

Current director and Shatitsirótha of the Waterloo Indigenous Student Centre (WISC) at St. Paul's University College, Campbell educates students and advocates for classes in Indigenous Studies, including a brand new course, Indigenous Entrepreneurship.

One of her current projects is to inspire and encourage Indigenous youth to pursue their academic passions. Nominated in the three different categories, including 'Authentic Leader' and 'Difference Maker', Campbell has made a difference in the lives of people from all walks of life in her work as an Aboriginal Resource Officer with the Regina Police Service, an Aboriginal Community Coordinator and Counsellor, and a Professor and Lecturer at universities across Canada, and as a speaker at TedX and leadership conferences.

IMPRINT ACKNOWLEDGES THAT THE UNIVERSITY OF WATERLOO IS SITUATED ON THE TRADITIONAL TERRITORIES OF THE ATTAWANDARON (NEUTRAL), ANISHNAABEG, AND HAUDENOSAUNEE PEOPLES. THE UNIVERSITY OF WATERLOO IS SITUATED ON THE HALDIMAND TRACT, LAND PROMISED TO SIX NATIONS, WHICH INCLUDES SIX MILES ON EACH SIDE OF THE GRAND RIVER. THEREFORE, IMPRINT RECOGNIZES AND RESPECTS THIS LAND THAT IT IS SITUATED UPON.

UW INDIGENOUS STUDENT ASSOCIATION



How the Waterloo community supports the Land Back Movement

Grace Xie
Editorial Assistant

In support of the Land Back Movement, the Waterloo community came together to build a tiny house to help the Indigenous community protect their land. *Imprint* spoke with Adrian Blackwell, an associate professor in the Architecture faculty at UW, as well as Rob Reid, a UW Engineering alumnus for more information on the project.

“The Land Back Camps that have existed since summer in Caledonia and in Kitchener-Waterloo, those struggles are ongoing and have been ongoing for a long time before and the university has done very little to acknowledge its place in this territory...I see it’s kind of one part of a larger conversation, but maybe the most immediate. I think some of us felt glad to be able to do something tangible in the short term,” Blackwell said.

On Tuesday, Jan. 12, 2021, a small house was built on 1492 Land Back Lane, also known as the Haldimand tract – which spans six miles on either side of the Grand River and is where UW resides. In response to the ‘Caledonia Land dispute,’ an ongoing legal battle between the Six Nations of the Grand River and the Government of Canada, in which the land given to the Six Nations was sold and by various Canadian governments. In order to protect these lands, protesters also referred to as “Land Defenders,”



The house was built on Jan. 12, 2021, on the Haldimand tract.

came together and refused to leave the site in order to protect their land.

“In the summer, in response to construction starting on that land, the community reoccupied the site and they stayed intense which was fine for a while... All the topsoil is gone, it’s just a slink wasteland of clay. So anytime

there’s any wind or rain, all the tents would be blowing over and sitting in puddles. With the winter, they needed more permanent solutions to be able to stay on the site... so the only real way to have a voice is to stay there as long as possible. What we’re doing with the house is to give them a place to stay on

the line and occupy it and assert their rights to that land,” Reid said.

Furthermore, both Reid and Blackwell talked about how there needs to be more action from the university, as well as pushing to have these hard conversations in order to initiate real change.

“One of many institutions they can contribute to as a solution that recognizes Indigenous sovereignty and really comes to terms with the fact that we’re still profiting from this stolen land and that the university is still profiting from this stolen land, and it’s not enough just to say we know we’re stealing it – we’re invited guests who are taking resources and limiting Indigenous people’s livelihoods,” Reid said.

They also provided insight on some initiatives that support Indigenous peoples such as working alongside the Faculty Association at the University of Waterloo (FAUW) to structure the university around free admission for people from the Six Nations to UW and other universities on the Haldimand tract.

The two also provide resources for others to support the Land Back movement and get involved such as following the 1492 Land Back Lane social media accounts, volunteering, and donations.

“I want to say that what we’re doing is a very small niche... and so we don’t want to distract the conversation from the voices of people who are trying to get their rights recognized,” Reid said.



Protesters are also referred to as “Land Defenders.”



The Haldimand tract spans six miles on either side of the Grand River.

sports & health



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Beat The Winter Blues with Homewood's Tips for Combatting Depression

Tara De Boer
Reporter

The next few months will be challenging to say the least. It's difficult enough battling cold Canadian winters, but with the added feelings of uncertainty and anxiety surrounding the pandemic, winter 2021 will be especially tough mental health-wise.

Depression is one of the most common mood disorders which can have serious and long-lasting implications on an individual's physical and mental health. Fortunately, a local care facility, Homewood Health, is sharing their expertise on combating depression by offering practical tips:

Reflect

Homewood suggests reflecting on the holidays to keep a positive mindset and identify how you want the year ahead to pan out.

First, think of what the enjoyable moments were. What were your goals? What did you do? What were you feeling? What went well?

Then, think about what was important. What can you take

away from them? What did you learn about yourself?

Finally, think about what's next. What can you do to learn more about them? What could you improve? What could you do differently next time?

Re-approach your Finances

Set aside a little bit of money each day, or each week. Keep it separate from your everyday spending, so you can see it starting to add up. If you don't have the cash to spare, but do participate in loyalty programs (such as PC Optimum), and your everyday spending throughout the year might help you get a "reward" when you need it. Save all those points and use them to cover the cost of some of your preparations or on a special gift for next year.

Find a Reason to Celebrate

Consider starting a new tradition for next year's celebration. Or, try recording one thing you're grateful for each day. Share these at a special occasion or event next year.

Stay Active

Studies show that 20-30 minutes of physical activity a day can help relieve symptoms of mild to moderate depression. Physical

activity releases endorphins, a powerful chemical in the brain that energizes and lifts one's spirits. (YouTube has tons of great at-home workouts).

Practice Mindfulness

Being mindful of negative thoughts can help to isolate the feelings, and reframe the experience in a constructive manner. By practicing this consistently, individuals may recognize negative thoughts, and work to change the way the experience is perceived, retraining the brain to think more positively over time.

Get your Zzzzz

Develop a regular sleep schedule to get your body on a regular sleep-rise rhythm. Homewood notes that many people with depression often have symptoms of insomnia, which can impact someone's ability to fall asleep and often worsens depressive symptoms.

Give yourself a Boost with Healthy Food

Foods that are high in vitamins and minerals are known to help regulate serotonin levels which may help to reduce symptoms of depression and mood swings. Incorporate some of these foods into your day: B12 and folate (len-

tils, almonds, spinach, chicken, fish), Omega-3 fatty acids (haddock, salmon, nut oils, algae, cod), Selenium (cod, brazil nuts, walnuts, poultry), Vitamin D (bread, milk, breakfast cereals).

If you or someone you know may be facing extended periods

of depression, seek out professional support from a qualified healthcare professional. They will be able to provide you with a range of options from therapies to medications, or lifestyle approaches to alleviate symptoms of chronic depression.

If you or someone you know may be facing extended periods of depression, seek out professional support from a qualified healthcare professional.



COURTESY FREEPIK

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The city of Waterloo launches a Community Happiness Project

Nicola Rose
Reporter

The City of Waterloo is launching a community happiness project. City residents are encouraged to submit positive images and recordings to spread kindness, optimism, and connection with their community members.

Starting in Mar. 2021, these messages of hope and togetherness will be assembled into signs and shared throughout the city. The finished product will then be accessible by QR codes.

The project is intended to remind the people of Waterloo that we are all in this together and that we will get through the challenges of the COVID-19 pandemic as a community.

"Being isolated from one another does not diminish the strength of our community. Now more than ever we need safe ways to connect," Dave Jaworsky, Waterloo's Mayor said. "Throughout the pandemic, the community has shown tremendous support for one another. The Community Happiness Project allows residents to both give and receive messages of hope and positivity. It helps us remember we are all in this together."

However, some Waterloo residents are critical of the city's Happiness initiative. Users on Reddit, a popular social media site, express their understanding of the Mayor's statement as hypocritical and out of touch.

"Being isolated from each other DOES diminish the community," wrote one user. "The internet can't fix that."

The same user called the project "upper middle class arrogance at its worst," and invited the Mayor to sit in their small home, "day after day, month after month, surviving on a tiny income."

"This is the type of idea that gets cooked up by someone not struggling to pay their bills and with no

concept of what it's like to be in the working class," wrote another user.

However, other people have noted that social initiatives, even virtual ones, are key for improving our mental health during COVID-19.

According to Dr. Laurie Santos, a cognitive scientist and Professor of Psychology at Yale University, "research suggests that happy people tend to be relatively social."

While Santos acknowledges that socializing can be difficult during the pandemic, she believes that technology can sufficiently supplement in-person connection. "The research suggests that

the act of hanging out with folks in real time, in other words, things like Zoom or FaceTime can be a really powerful way to connect with people," she said.

Under the Community Happiness Project post, one user agrees.

"I would certainly feel a lot more isolated than I currently do without the internet. Video chatting and instant messaging isn't the same as physically being with people, but I'm glad it's an option."

Waterloo is not the first city to implement a happiness initiative since the start of the COVID-19 pandemic. Around the world, municipal leaders are supporting projects that will benefit their citi-

zens' mental health and wellbeing.

Winnipeg, Manitoba launched a Wellness Fund to support community initiatives and help decrease suffering caused by the pandemic.

Schools, businesses, associations, and other groups in Winnipeg are encouraged to submit ideas that would allow residents to participate in fun, safe activities throughout the winter.

"Have an idea that will put a smile on your neighbours' faces this winter and financial support would be appreciated? This fund is for you," John Orlikow, Winnipeg City Councillor said.

In Australia, the City of Melbourne offered a Happiness Stimulus

Package to fund ideas that would bring happiness and joy to the community during the pandemic. City residents were able to suggest activities they thought would bring happiness to their neighbours.

Other residents could support the ideas they liked, and the most popular suggestions received city funding.

Several private companies also offered their services to help improve community wellbeing, such as one children's entertainment company that offered a Character Drive By where they helped children participate in physically distanced games.



Princess Cinemas auctioning off poster collection to film buffs

Lauren Speight
Arts and Life Editor

Local businesses continue to suffer financial losses at the hands of COVID-19, and in an effort to stay afloat and raise funds for their eventual re-opening, Princess Cinemas is holding their first-ever poster auction.

For 35 years, KW's Princess Cinemas has been providing our community's film lovers with the very best in international, independent, and Canadian cinema, as well as festival hits and cult classics.

This local gem is one of Canada's longest-running independent art-house cinemas and was voted "Favourite Movie Theatre" by Waterloo Region Record Readers. What was supposed to be the year of their 35th anniversary turned into their toughest year yet, and to tide them over the next few months, they have begun auctioning off their impressive poster collection to local film buffs and beyond.

Since the early 90s when they started seriously collecting posters, the Princess Cinemas has amassed a collection of over 5,000 posters from films they've shown over the years — everything from cult classic reruns

to popular Hollywood blockbusters. Their catalogue even includes posters for art films, concert films, and documentaries.

The auction is happening online and can be found on the Princess Cinemas' website. Each lot will contain 20-30 posters, and will be live for 8-10 days. The auction has already seen great enthusiasm, with original movie posters from the new Star Wars trilogy already having bids at over \$450 CAD each. "We're going to do it in multiple lots because we have so many," says John Tutt, Owner and Manager of Princess Cinemas. "At some point, we're also going to post memorabilia, like reels. We have a lot of film reels from the old 35mm film days, and poster cases and different things."

In addition to the poster auction, the Princess is continuing to sell seat sponsorships and merchandise. Patrons can sponsor a seat at the original Princess location, or at the Princess Twin. For \$250, your name or dedication will be put on a brass plaque and fastened to a seat of your choice. The funds raised from seat sponsorships will help the cinemas weather the pandemic storm and go toward new and improved seating at both locations.

The Princess Cinemas is a beloved local treasure that has shown genuine care for the



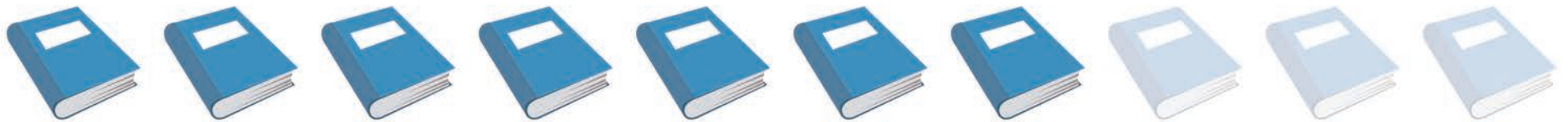
COURTESY PRINCESS CINEMAS

Princess Cinemas has been providing the KW community with the films for 35 years.

KW community since 1985. Their passion for film and dedication to creating the best atmosphere is what makes them a movie-go-

ers' favourite. For more details about their current fundraising initiatives, visit the Princess Cinemas' website.

Book Review: A Time for Mercy



Muhammad Saifuddin Hashmi
Reporter

A Time for Mercy, John Grisham's latest novel and the third book in the Jake Brigrance Series was finally released on Oct. 13 2020. You may have heard of the first novel of this series -A Time to Kill—which was adapted into a film, starring Sandra Bullock, Matthew McConaughey, and Samuel L. Jackson, in 1996. Grisham was a practicing lawyer for over a decade, but he's most famous for writing legal thriller novels. Having spent a lot of time in courtrooms and in front of juries, Grisham is able to use his writing skills to make the reader his "second chair" in his fictional courtrooms.

The book revolves around Jake Brigrance, a small-town "street lawyer", trying to save yet another person in Clanton, Mississippi, from death row. This time, a 16-year-

old child, Drew Gamble, stands accused of murdering his mother's abusive boyfriend, Stuart. Drew's mother and younger sister were often victims of domestic abuse from Stuart. Drew shot him under the impression that Stuart beat his mother to death. As a minor, Drew would not have faced the death penalty but for one important fact: Stuart Koffer was a lieutenant in the police. Having all odds stacked against him as always, Jake must find a way to win this case, while managing his perpetual financial problems.

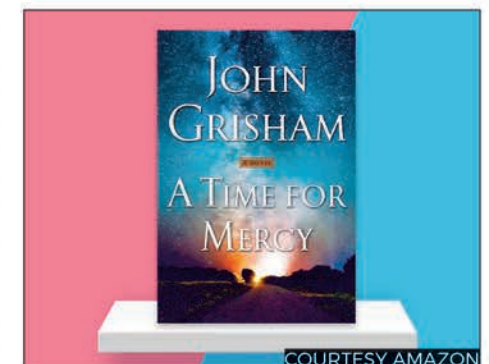
Quite often, thriller novelists write very suspenseful stories which are plagued with plot holes, making the story hard to believe (and sometimes laughable). The best part of this book, though, is how real all the characters are, and how brilliantly Grisham keeps the plot realistic, and the readers at the edge of their seats. Jake's ultimate "triumph", against all odds-with no miracles

in his favor- illustrates how a person's talents and persistence can always overpower one's misfortunes.

In my opinion, this book is not at par with the other novels in the Jake Brigrance Series. A Time for Mercy is very well written, however, the previous two books in the series were much more suspenseful. Although a white male, Jake faced an added obstacle of racial discrimination in the previous books, since his clients were African Americans. The social injustice element resulted in violence against Jake which intrigued readers to see Jake's clients prosper in the previous stories. Perhaps in response to recent events of police brutality in the US, Grisham wanted to explore a new theme of having one bad apple in the police force and other officers choosing to defend their comrade.

Overall, A Time for Mercy is an excellent read for anyone looking for a thrill-

er movie in book form. I would especially recommend this book (in fact, all of John Grisham's books) for those trying to learn more about the legal system in the US or Canada. I would suggest that before reading this book, one should definitely read its prequels A Time to Kill (1989) and Sycamore Row (2013). I rate this book a 7/10.



COURTESY AMAZON



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Laser Woman: An Interview with Donna Strickland on her CPA Laser Technology



COURTESY UW

In 2018, Dr. Donna Strickland received the Nobel Prize in Physics for her work on lasers.

Hassan Subhi
Reporter

Dr. Donna Strickland, is a professor in the Department of Physics and Astronomy at the University of Waterloo. She received the Nobel Prize in Physics in 2018 for her work on lasers.

The prize was shared with her PhD supervisor Gérard Mourou, who worked with her to develop the new laser technology back in the 1980s. This achievement was the work of her PhD thesis while at the University of Rochester.

Both Strickland and Mourou worked to broaden our understanding of how lasers operate, and it also unravelled a new breakthrough in the field – they were able to exceed the power limit of a laser beam with the shortest pulse. The beam gets stretched out and then amplified with energy, then this same beam gets compressed into a very short pulse, thus creating the shortest laser pulse with the highest intensity ever made.

This new technology became known as Chirp Pulse Amplification.

Hassan: Your work on lasers

is groundbreaking in the field of physics, specifically, optics and light. Can we first start off with what lasers are? And how are they made?

Donna: Lasers are sources of coherent optical radiation. Coherence means that the waves have no phase jumps on average over a period of time given by the coherence time. Incoherent light from the sun or a desk lamp has coherence times of no more than a couple of periods of oscillation. The laser can have coherence lengths of millions of optical periods. The coherence time is inversely proportional to the spectral bandwidth.

Lasers have four components to make them work. First, you need the gain medium. Second, a pump source to excite the atoms in the gain medium. Third, is the optical cavity, which plays a number of roles. It selects the cavity modes – both spectral and spatial. The modes give the coherence. The optical cavity also allows the beam to travel several times through the gain medium so that the gain is extracted. Finally, the fourth component of a laser is the output coupler. One of the cavity mirrors cannot be a 100% reflector or no

light would leave the laser. One of the mirrors will have a small transmission and that allows the beam to exit the laser.

The coherence of a laser comes from two things. First, the light is amplified by stimulated emission, which is the deexcitation of an excited atom by a photon yielding a second photon having the same energy, momentum and phase.

However, this is not sufficient as the stimulated emission process has a bandwidth given by the lifetime of the excited state. Secondly, the bandwidth of laser light is further restricted by placing the gain material inside an optical cavity often composed of two mirrors.

The cavity only allows modes where integer multiples of half the wavelength equals the cavity length. You can have a single mode laser which has the longest coherence length if the bandwidth of the stimulated emission is less than the wavelength separation of the modes.

The bandwidth of this single mode is given by the inverse of the average time the photons remain in the cavity, which is determined by the cavity losses of which the main loss is typically caused by the transmission of the output coupler.

The spatial coherence is also set up by the cavity as it requires the modes to exist across the entire spatial profile and this generates the spatial mode, which is typically a gaussian beam.

Hassan: Can you explain briefly what was your contribution to the field of lasers?

Donna: My main contribution was the co-development of Chirped Pulse Amplification. This development allowed short pulses to be amplified to large energies for the first time. This is needed for applications requiring high peak power which is given by the energy divided by the pulse duration.

Hassan: In your laser invention, you succeeded in making short in-

tense pulses of light. In order to be able to do that, you needed a lot of colors to make the pulse short. Can you elaborate on why that is?

Donna: A purely single wavelength is a wave that exists for all time. This comes from Fourier transform theory.

The intensity of a single wavelength would be a constant as a function of time. If you add two different wavelengths, the intensity would vary sinusoidally with the beat frequency given by the difference in the two frequencies. If you add several frequencies that are all separated by a given frequency difference you get a pulse train, where the time between the pulses is the inverse of the frequency separation. The duration of the pulses is inversely proportional to the total bandwidth, which would be given by the frequency separation times the number of frequency modes.

For the pulse to be very short, you need a very large spectrum.



COURTESY NOBEL MEDIA

Dr. Donna Strickland shared her Nobel prize with her PhD supervisor Gerard Mourou, who worked with her to develop the new laser technology back in the 1980s



COURTESY UW

Dr. Donna Strickland's main contribution to the field of lasers was the co-development of the Chirped Pulse Amplification.

The opposite of a single frequency giving an infinite pulse length or coherence time, is that an infinitesimally short pulse would need an infinitely wide frequency spectrum.

Hassan: In 2018, you won the Nobel Prize in Physics for your work shared with your PhD supervisor Gerard Mourou and Arthur Ashkin. How did it feel to receive the Nobel prize?

Donna: It is hard to explain how it feels. It is an exciting but surreal experience. You cannot believe you are winning it. It is a life changing experience. The most surreal moment for me was when I was asked to sign the book in the Nobel Foun-

dation that has all signatures of all the Nobel prize winners. Before they had me sign the book, they showed me the signatures of Albert Einstein and Marie Curie. I couldn't believe that I was signing the same book.

Hassan: Alfred Nobel wrote in his will on the Nobel prize, "prizes to those who, during the preceding year, have conferred the greatest benefit to humankind." Your discovery falls under that category. What are the applications of your new laser technology?

Donna: The main application used today concerns machining transparent objects. Before CPA, laser machining occurred because

the laser light was absorbed causing a thermal reaction. With the high intensity of CPA, the interaction is a nonlinear ionization. This interaction is highly intensity dependent and so is much stronger at the focal point. You can focus a beam inside a transparent medium such as glass or the cornea of an eye and cause this ionization inside the medium only where the beam is focused.

This process is used to cut a flap in the cornea by scanning the focused beam over an area inside the cornea. The same process is used to cut very small holes in glass parts used in things such as cell phones.

Hassan: The name of your new discovery is called Chirp Pulse Amplification. What does "chirp" mean here?

Donna: Chirp means that frequency changes with time. In order to amplify a short pulse, you must first make it a long pulse so the peak power does not get too high in the amplifier. The peak power divided by the beam area is known as the laser intensity.

If the laser intensity gets too high, the beam can start to self-focus, which means the beam gets even smaller and the intensity increases causing the self-focusing to be a run-away phenomenon causing beam collapse that causes damage in the laser amplifiers. We used dispersion which causes different frequencies to travel at different speeds.

After travelling through a normally dispersive medium, the lower energy or redder colours will have moved out ahead of the peak of the pulse and the higher energy or bluer colours will have lagged behind the pulse. The pulses were then chirped red to blue which is known as a positive chirp. The pulse is then necessarily longer than if all the colours had travelled together to remain with the peak of the pulse.

Hassan: What do you have to say to young people who are passionate about science and the natural world?

Donna: I think people who get to work on something they are passionate about are very lucky people and they shouldn't take the opportunity for granted. It can

be frustrating when the answers don't come easily, but we have to remember that the questioning is the experience to be relished and the exploration of new ideas is the fun of science.

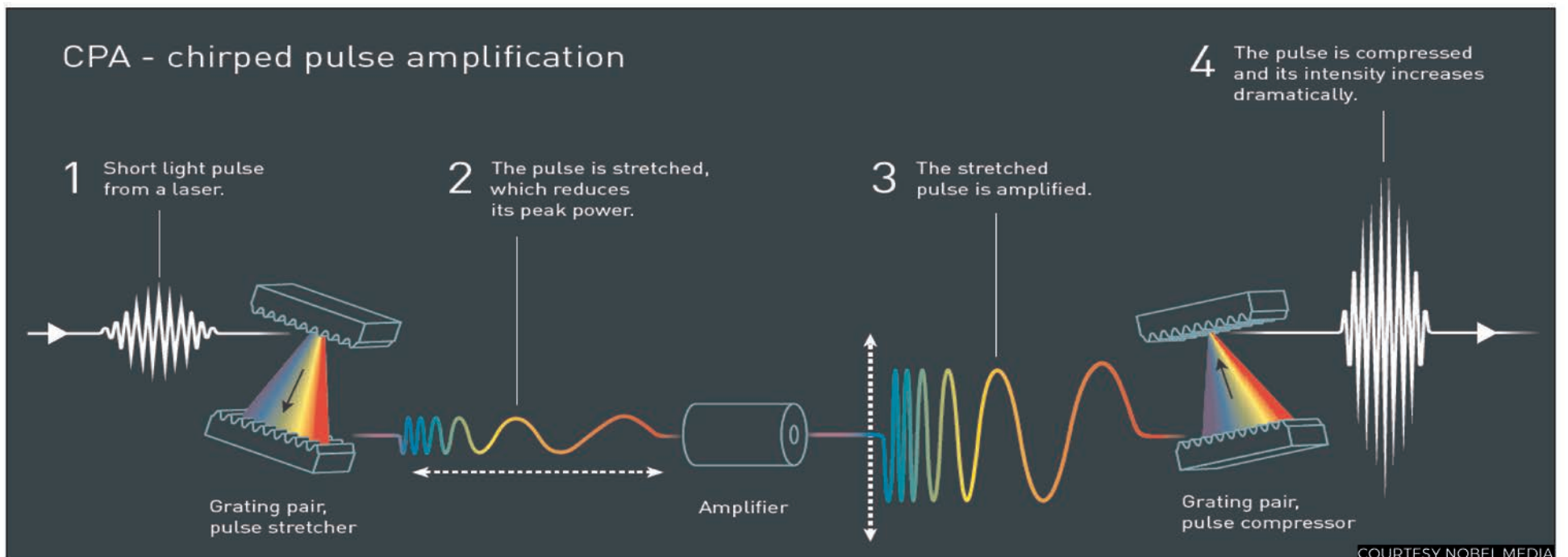
Hassan: When the Nobel Committee announced the 2018 Nobel prize winner for physics, they wrote "Donna Strickland, the third woman in history to win the Nobel Prize in Physics." What advice do you have to women in science?

Donna: I don't have different advice for women than men. I think we all have to know for ourselves what we really want to do. Then we should all try to do it to the best of our ability. We must take pride in our own achievements whether or not they are recognized by others.

Hassan: I have looked up your PhD thesis and it was only three pages long, yet it is a very well written paper. Do you think simplicity is necessary in science? Or sometimes things need to be hard and lengthy in order to be understood?

Donna: My first paper that won the Nobel prize was only 3 pages. My PhD thesis was quite a bit longer and was not only about developing CPA but also using CPA to investigate multiphoton ionization at ultrahigh intensities.

Thank you for thinking my paper was well written. Papers seem to get longer over time. If you go back to the sixties, many optical technology papers were only half a page with probably only one reference (we were less concerned with citation counts back then).



The Chirped Pulse Amplification or CPA device was co-created by Dr. Donna Strickland and Gerard Mourou. The laser invention is now used in corrective eye surgery, industrial machining and medical imaging, and it's essential to most high-powered laser facilities.

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Next scheduled post-mortem meeting:
 Virtual due to Covid-19

Next scheduled board of directors meeting:
 Virtual due to Covid-19

opinion

HAVE YOUR SAY

Submit your letter to the editor or your community editorial to opinion@uwimprint.ca. Find more opinions at uwimprint.ca.

UW's facilitative financial support for studying remotely

For students on a study term this winter, regardless of their immigration status, UW has introduced financial aid to facilitate studying remotely. Known officially as the 'Academic Readiness Bursary' or ARB, provides students with the option to purchase anything to help study from home. UW will reimburse up to \$500 of that amount. These purchases could include anything from desks and monitors to iPads or academic books. Students are required to fill out a bursary form which can be found under the 'Financial Aid' section of Quest, within the 'Bursaries' tab. The form requires some general financial information along with the receipt of the item(s) one has purchased, followed by an explanation of why it is required by the student. More information can be found on UW's website.

I personally claimed the ARB to buy an iPad for myself, and have had a much easier time with consolidation of notes and completion of typed assignments that are significantly harder to complete on PCs. Of course, an iPad comes with many other applications and resources at my disposal to facilitate other tasks as well. I think that the ARB is an excellent way for UW to show support for their students. Financially aiding students with purchasing tools for online classes is a strong motivator for students to get organized and consequently do better during their academic term. I think that a change in one's work environment in some way, be it at a different location (which is not quite feasible given the status quo), or with the addition of new equipment, will help keep one's mind more aware and active in construc-

tive ways. For myself, having a new iPad will encourage me to use it for advancing my study habits and possibly developing new ones.

Furthermore, any financial aid in these difficult times, where many families and students' employment statuses could be affected, thereby impeding income, is a huge support and one that is recognized by UW. The fact that they offer this generous support to students is a huge reassurance and encourages me to look on the bright side of things, despite any difficulties that the status quo might present.

Rohit Kaushik
 3A, Computer Science





PHOTO/VIDEO

REPORTING

PROOFREADING

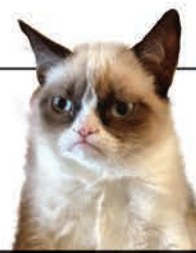
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LAYOUT/WEB

GRAPHICS

distractions



Q: WHAT KIND OF CATS LIKE TO GO BOWLING?

A: ALLEY CATS

Sudoku puzzles

Every Sudoku has a unique solution that can be reached logically. Enter numbers into the blank spaces so that each row, column and 3x3 box contains the numbers 1 to 9 without repeats.

Easy

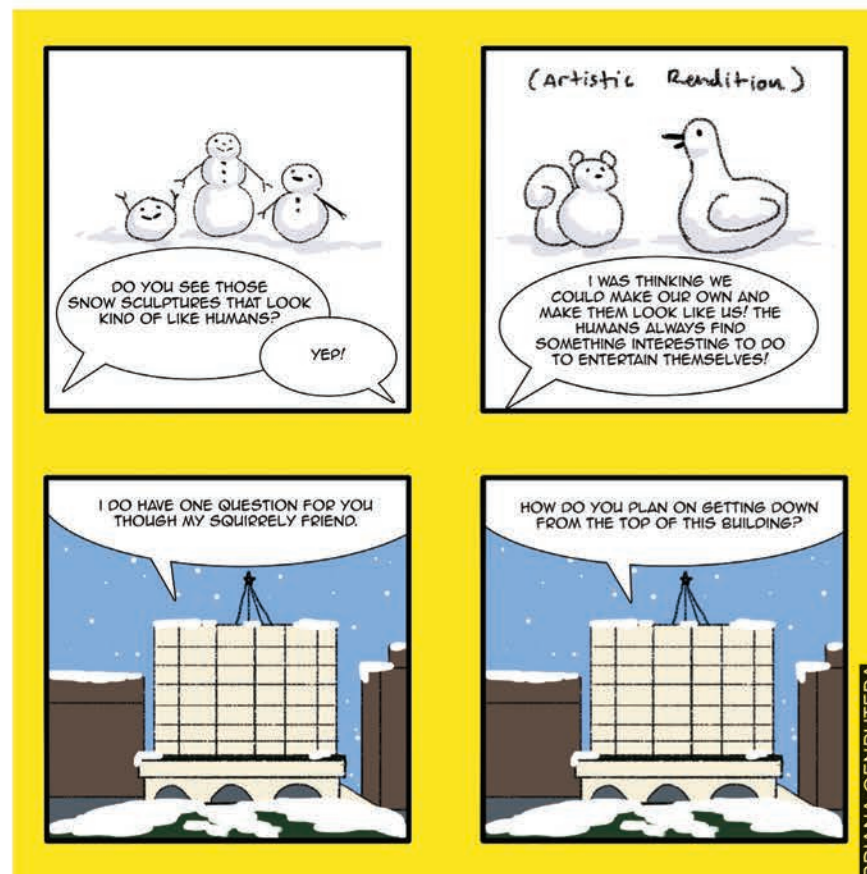
	9			7			4	2
			4		8	5	1	9
4	8		2					3
	3	7				2		5
				5				
8		1				4	3	
3					2		5	7
5	7	8	6		4			
9	1			3				8

Hard

5		3		2	6			
	7							
	4		5		9		6	
3					5			4
2				1				8
7			3					1
	2		4		1		9	
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			6	8		4		3



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